

Integrative Research Group Meeting

Wageningen University & Research, Wageningen, the Netherlands

2-4 March 2020

MEETING REPORT

The fourth annual meeting of the Integrative Research Group (IRG) of the Global Research Alliance on Agricultural Greenhouse Gases (GRA) was held at Wageningen University & Research, Wageningen, the Netherlands on 2-4 March 2020, and it was linked to the second CIRCASA¹ annual meeting. The meeting was chaired by Beverley Henry, Australia, Jean-François Soussana, France, and Pamela Joesse, Canada (co-Chairs of the IRG).

This report is a summary of the key discussions and outcomes of the meeting. PDF's of the presentations are provided separately on the GRA website.

PARTICIPANTS

The meeting was attended by 42 participants, representing thirteen member countries of the IRG (Appendix 1). Several key scientists attended the meeting, as well as representatives from GRA partners (AGMIP², "4 per 1000" initiative, CGIAR³ CIRCASA and FAO⁴), and representatives from Madagascar. Apologies were received from China and Italy who were unable to attend due to COVID-19 travel restrictions.

- **Countries represented:** Australia, Canada, France, Ireland, Madagascar, New Zealand, Norway, Peru, Poland, Spain, Switzerland, the Netherlands, United Kingdom and United States of America.

MEETING OUTCOMES

The meeting updated attendees on the outcomes of the GRA Council meeting, other Research Groups' progress, other countries' contributions, Networks' progress, and opportunities that have arisen. There were breakout sessions to develop work programmes for the Networks. The IRG also committed to the following:

- adopting a new Circular Food Systems Network to be led by the Netherlands;
- continuing with the successful webinar series;
- searching for a new lead for the Farm to Regional Scale Integration Network following Petr Havlik standing down;

¹ CIRCASA - Coordination of International Research Cooperation on Soil Carbon Sequestration in Agriculture

² AGMIP - Agricultural Model Intercomparison and Improvement Project

³ CGIAR - Consultative Group for International Agricultural Research

⁴ FAO - Food and Agriculture Organization

- closer collaboration with AgMIP, including a meeting to promote the relationships and potential shared projects between various groups of modellers; and
- the sharing of resources and expertise to enable consistency across projects and reduce duplication of effort across the Greenhouse Gas Inventories and NDC⁵s support Network.

Next meeting:

- IRG is exploring options and welcomes suggestions for location and timing of their next meeting.

SUMMARY OF DISCUSSIONS

OPENING REMARKS

1. The meeting was co-chaired by Beverley Henry, Jean-François Soussana and Pamela Joose, who welcomed participants to the meeting. They thanked Wageningen University & Research (WUR) for hosting the meeting at short notice, and Cristina Aria-Navarro (INRAE⁶) and Peter Kuikman (WUR) for the effort that they had put into organising the meeting. An update on the effects of the COVID-19 (novel coronavirus) epidemic was provided and safety matters addressed.

UPDATE FROM THE SECRETARIAT

2. The GRA now has 62 Member Countries. Ten new members (Benin, Cameroon, Cote d'Ivoire, Ethiopia, Eswatini, Malawi, Mongolia, Nigeria, Uganda and Zambia) joined in the past year. The GRA now works with 22 Partner organisations. The five partners that have joined since the 2019 IRG meeting are:
 - Agricultural Model Intercomparison and Improvement Project (AgMIP);
 - Caribbean Agricultural Research & Development Institute (CARDI);
 - International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM);
 - European Commission (EC); and
 - Greenhouse Gas Management Institute (GHGMI).
3. Outcomes from the 2019 Council meeting that are of relevance to the IRG include:
 - Indonesia took on role of Council Chair with Australia confirmed as Vice-Chair.
 - The terms of reference for the Enhanced Secretariat and the GRA Special Representative were noted as approved.
 - The proposed new framework for Flagship projects was accepted by the Council. Under the new framework, existing Flagships will be reviewed for alignment.
 - The Council proposed that the Circular Food Systems Flagship taskforce be established as a Network, in light of the re-framed criteria for Flagship projects. The IRG were asked to consider hosting this new Network.
 - The Secretariat updated the Operational Plan to reflect completed and new or consolidated actions from the previous Council meeting. Further, the Communications Strategy document has been adopted.
 - The Council established a working group to develop the 2021-25 Strategic Plan, which will replace the current 2016-20 Strategic Plan. The Council members in the working group are

⁵ NDCs – Nationally Determined Contributions

⁶ INRAE – National Institute of Agricultural Research, France

Australia, Canada, China, Germany, Indonesia, Netherlands, New Zealand, Tunisia and Zimbabwe. The working group will give consideration to synergies between mitigation and adaptation practices and technologies and develop a communications action plan.

4. It is important to consider that the work of the IRG cuts across and builds on the work of all of the Research Groups. Activities of other Research Groups that are of relevance for the IRG include the following:
 - The Livestock Research Group (LRG) held three low emissions livestock development capability building regional workshops in East Africa (July 2018), West and Central Africa (April 2019) and Southern Africa (July 2019), resulting in new member countries joining the GRA.
 - The LRG is establishing a ‘roster’ of experts for use in disseminating knowledge and skills specifically in the context of greenhouse gas inventories, for monitoring, reporting and verification (MRV) and NDCs. This is of relevance to the IRG, in particular the Greenhouse Gas Inventories and NDCs support Network.
 - The [MRV platform](#), established by the LRG, shares case studies, analysis, databases, methodologies, technical guidelines and emission factors, among other resources for quantification of agricultural greenhouse gases. There are a number of resources of relevance to IRG Networks.
 - Senegal has been confirmed as the third co-Chair of the PRRG and has established an African sub-Group. The increasing commitment to, and involvement in, GRA activities from new African members will be crucial in the development of successful research collaborations and knowledge sharing.
 - The PRRG has submitted, to the GRA Secretariat, the “Mitigation in Irrigated Rice Systems in Asia (MIRSA)” project as a Flagship under the new guidelines.
 - The Croplands Research Group (CRG) are developing a collaborative manuscript addressing biophysical opportunities, constraints and caveats of greenhouse gas mitigation options. They are also compiling a special issue based around a meta-analysis on nitrous oxide emissions and producing a publication on soil carbon sequestration and agroforestry.
5. The GRA Secretariat has established a formal relationship with RUFORUM⁷ to allow the GRA to support students through the RUFORUM grants system. RUFORUM has a membership of 126 universities in 38 African countries. Within currently available resources, the GRA aims to support 8 “Graduate Research Grants” (i.e., 8 Principal Investigators, 16 MSc students and 32 Undergraduate students) across RUFORUM member Universities.

Flagship Project Guidelines

6. The following criteria form the basis for which a proposed Flagship project will be assessed, and recommended to the Council for endorsement by consensus. A Flagship project template (Appendix 2) is to be completed by the Flagship project lead and once endorsed, the Flagship will be profiled on the GRA website. Once the project is completed, final outcomes will be presented to the Council.
7. Criteria for a Flagship project include:
 - **Project Scope:** Project timeline (defined end date) specified, project outcome defined and globally applicable.
 - **Project Participation:** The project will benefit from GRA wide collaboration and, where possible, global participation in their delivery. The project will have an identified community of experts within GRA membership (i.e. be proposed by one of the Research Groups, or their

⁷RUFORUM - African Regional Universities Forum for Capacity Building in Agriculture

Networks, or have key members act as coordinators if the Flagship project focuses on a cross-cutting issue). The project will provide a range of collaboration opportunities, including low cost data, sample or knowledge sharing.

- **Research:** It is proposed that Flagship projects develop new knowledge, validate approaches, methods or hypotheses; and have high scientific impact.
- **Resourcing:** Flagship project leaders should be clearly identified and resourced to complete the project within the specified time-frame. Research Group co-Chairs should not bear the responsibility of leading Flagship projects, except presenting updates at the annual Council meeting, if required. Flagship projects must identify at least five Council champions (members and partners), consisting of at least three GRA member countries. A minimum of 30% of required funding must be confirmed for the Flagship project lead and core project activities (cash or in kind contributions of total project costs). Proposed funding mechanisms for additional activities and contributions must also be identified (i.e. fellowship fund, workshop funding, or research call).

CLIFF-GRADS Programme (est. 2017)

8. The Climate, Food and Farming - Global Research Alliance Development Scholarships (CLIFF-GRADS) Programme is a joint initiative of the GRA and CGIAR's CCAFS⁸ programme. These scholarships support short research visits of up to 6 months, with research grants of \$12,000 USD, for PhD students from, and studying in, developing countries. CLIFF-GRADS provides exposure to expertise, software and technical equipment that the PhD student would not otherwise have access to in their home country and institute. Over three rounds, 73 awardees have been supported from 23 developing countries. This has been in partnership with 26 research institutes from 21 countries.
9. Round four of CLIFF-GRADS closed on 1 April 2020 and winning candidates are expected to be announced in June 2020. There were 54 opportunities advertised in this round. Some minor delays are expected due to the impact of COVID-19 restrictions. Submission of proposals for hosting in Round five will open in late 2020 or early 2021.
10. IRG members can use the CLIFF-GRADS programme to advertise existing research projects that are under-resourced, for short-term scientific training and research stays on topics related to the measurement and management of greenhouse gas emissions and carbon storage in agricultural systems.

UPDATE ON THE PROGRESS OF THE IRG

11. Jean-François Soussana updated attendees on the progress of the IRG since the last meeting. He referred to the role IRG members had played in the UNFCCC⁹ Koronivia workshops on soil carbon, the contributions to the IPCC¹⁰ Special Report on Climate Change and Land, how the IRG has worked with the other GRA Research Groups and the structural changes that have been made to the IRG.

⁸ CCAFS - Climate Change, Agriculture, Food Security

⁹ UNFCCC – United Nations Framework Convention on Climate Change

¹⁰ IPCC – Intergovernmental Panel on Climate Change

12. Achievements for the IRG in the past year include a successful webinar series, publication of the [Smith et al research article](#)¹¹ that assessed practices to deliver food security in the face of land challenges, and two other research articles currently in revision.

NETWORK REPORTS

Farm to Regional Scale Integration Network – Pamela Joosse

13. After being co-led of the Network for three years, Petr Havlik is standing down. This is a large loss to the leadership of the Network and a new co-lead is sought. The Network ran a modelling masterclass in Brazil and produced a research article looking at the economics of soil carbon sequestration under different tillage options.
14. Discussions on future projects with AGMIP began at the 2019 Council meeting, looking to show the co-benefits of mitigation and adaptation in regional farming systems. There is planning underway for a workshop and potentially a collaborative white paper on this topic.

Greenhouse Gas Inventories and NDCs support Network – Richard Eckard

15. Accurate greenhouse gas inventories are necessary to quantify emission reductions that will result from changing management of agricultural systems. Inventories require emission factors and activity data, and many countries are limited to tier 1 inventories due restrictions in getting accurate data. There are a number of inventory and NDC related projects underway, and it was identified that there can be better collaboration across these projects. Improving agricultural inventories will enable countries to measure the effect of emission reduction and mitigation policies and may open up other funding opportunities.
16. A coordinated approach to inventory improvement is required so that existing systems can be improved rather than rebuilding them each time reporting is required.

Soil Carbon Sequestration Network – Jean-François Soussana

17. There has been a collective effort looking at soil organic carbon stock change. The challenge is that a large number of data inputs is required to get the level of sensitivity needed to accurately measure, report and verify soil organic carbon change. There are no international standards and different models are used across different countries.
18. A paper has been produced looking at the accuracy of different models on long term fallows. It looked at the differences between models and the accuracy provided by calibration measurements. There has been other work undertaken in collaboration with CIRCASA.

Discussion

19. IRG members work across multiple research groups and projects. This means that projects can work toward a shared goal from different directions. This works best when projects are aligned at the beginning and working toward a joint product. Trying to adapt them at a later time can cause issues around supply and access of resources. This can be seen in the lack of comprehensive flux measurement sites on long-term trials. For the IRG, the integration of soil organic carbon models between farm and regional level is considered an area with potential for improvement.

¹¹ Smith, P., *et al.* (2019). Which practices co-deliver food security, climate change mitigation and adaptation, and combat land-degradation and desertification? *Global Change Biology*. 1–44

20. The role of IRG Networks in supporting capability building and research in developing countries was discussed. It was reiterated that when projects are being designed, consideration should be taken as to how developing countries can be included.
21. For soil carbon to be included in national inventories, the history of land use, carbon stocks and fluxes needs to be documented. Accounting for soil carbon is of interest from many stakeholders for varying reasons. The IRG does not currently have a formal position on carbon accounting and accounting techniques in use. The focus for IRG has been on improving the science underpinning soil carbon flows and improving the understanding of decision makers. There is a need to understand the soil carbon balance before the system is monetised, otherwise no value will be able to be gained from it. Concern was raised that natural variation reflected in scientific uncertainties has been interpreted incorrectly outside of the scientific field and used to penalise researchers. This has led to challenges in delivering some of the research that is needed.
22. It was questioned if there is enough work being put into emission projections and modelling at the national scale. It was proposed to promote the links between the IAMC¹², AgMIP and the GRA. There is an opportunity to use the different strengths of different groups to work together and support each other. A workshop supported by New Zealand was proposed, potentially on the side of the IAMC annual meeting at the end of 2020.

PRESENTATION ON A CIRCULAR FOOD SYSTEMS NETWORK

23. At the 2019 Council meeting, discussions on the topic of “Circular Food Systems” resulted in a new IRG Network being proposed. Including this topic into the scope of the GRA was first raised in 2017 and has the backing of several member countries. A key issue has been how it sits within the GRA. Carla Boonstra (Netherlands Ministry of Agriculture, Nature and Food Quality) presented the case for establishing this Network to the IRG meeting attendees.
24. To ensure security of resources, there is a need to shift production systems to consider production efficiency and resource efficiency. Resources naturally cycle around food production systems. Efficiency of the system needs to improve. This has the potential to mitigate emissions through reduced losses from the system.
25. The topic of circular food systems has a wide scope, and therefore fits better within the IRG as opposed to the other GRA Research Groups. It will start as a Network with the potential to establish a Flagship project for the IRG in the future.
26. Discussion of the scope and structure of a Network covering this topic established that there is a need to clearly define the Network. There are many potential directions for the Network and having a clear definition will provide the best chances of the Network flourishing.

COUNTRY REPORTS

Australia – Beverley Henry

27. Australia is very supportive of the GRA. They are current vice-Chair of the Council, will host the 2020 Council meeting, co-Chair the IRG, co-lead the Greenhouse Gas Inventories and NDCs support Network, and are a member of CIRCASA. Australia have committed ~\$120 million AUD in over 200 projects across 35 countries. There is a \$3.5 billion AUD domestic climate change

¹² IAMC - Integrated Assessment Modelling Consortium

package that includes investment at the policy, project and research agency levels. There is also an international programme that Australia is progressing.

28. New opportunities are being caused by State Government investment, exploration of new carbon offset methods, industry targets, farmer led initiatives, and regional project opportunities. These link to each of the GRA's Research Groups.

Canada – Pamela Joosse

29. Across the scope of the GRA, Canada contributes to both the CRG and LRG networks, and they also co-Chair the IRG. Canada currently has 11 new or ongoing GRA linked projects totalling \$5.4m CAD, with two (~\$2.8m) involving interdepartmental research. There has also been \$200,000 CAD top up funding in the last four years, mostly for travel and workshops.
30. Canada has started new projects of interest to the IRG, including: further development of the Holos whole-farm model software and lifecycle assessment, the use of enhanced weathering to sequester carbon, and a watershed observatory aligned with the OIE's¹³ OneHealth concept looking at environmental change over the whole system.

France – Jean-François Soussana

31. France co-Chairs the IRG and also contributes to the work of the LRG and CRG. They have been looking at the potential for soil carbon sequestration in arable soils and predict that 30 million tonnes of CO₂ equivalent is sequestered under current practices. Research has also shown that climate change has impacts on soil organic carbon, however, although there are regional effects there is no significant average effect at a larger scale.
32. France leads CIRCASA and EJP-Soil¹⁴, hosts the "4 per 1000" initiative, and is active in Europe's FACCE JPI¹⁵. They are exploring new case studies with carbon offset projects in conjunction with Climate-KIC.

Ireland – Karl Richards

33. Ireland has set greenhouse gas and ammonia emission reduction targets and are facing challenges due to an increase of dairy production. Their Climate Action Plan outlines some potential mitigation methods. They have recently funded a greenhouse gas emissions centre of excellence and have an agricultural catchments programme incorporating greenhouse gas emissions as well as other environmental aspects such as water quality.
34. Ireland is working on ways to transfer knowledge through methods such as signpost demonstration farms (funded by Teagasc and industry). They are exploring actions across industry, policy and research.

Madagascar – Tantely Razafimbelo

35. Madagascan representatives are members of CIRCASA, Global Soil Partnership, CaSA¹⁶, GLOSOLAN¹⁷, and "4 per 1000"; they are interested in joining the GRA. Madagascar have partnered with Japan to use remote sensing in mapping soil carbon sequestration and are looking at farm scale soil carbon sequestration in a joint project with Benin and Senegal.
36. There are opportunities for future work focusing on improving greenhouse gas inventories (for use in biennial update reporting and national communications) and understanding carbon flows

¹³ OIE - World Organisation for Animal Health

¹⁴ EJP-Soil - European Joint Programme on agricultural soil management

¹⁵ FACCE-JPI - Joint Programming Initiative on Agriculture, Food Security and Climate Change

¹⁶ CaSA - Soil Carbon Network for Sustainable Agriculture in Africa

¹⁷ GLOSOLAN – Global Soil Laboratory Network

in mangrove forests. They are currently looking to develop a national scale soil carbon map and establish a national remote sensing network. They also have a project testing the suitability of organic fertiliser for soil restoration and are looking at the carbon footprint of forestry and agro-forestry, using tropical farming tools.

Norway – Teresa Gomez de la Barcena

37. Norway are members of CIRCASA and have an active soil carbon research effort. They have contributed to LEAP¹⁸ to help on a technical report and are seeking approval to update their country page on the GRA website.
38. PLATON¹⁹ project has received €7.5m EUR. Looking to develop a knowledge base, with an emphasis on socio economic impacts of climate policy. Norway have projects related to biochar, to carbon storage in grasslands, and the climate smart use of Norwegian soils. Norway contributes to EJP-Soil and improving IPCC reporting. The Research Council of Norway is funding work looking to better coordinate Norway's efforts internally and internationally, with aim of mapping and identifying research needs. Norway wishes to work with and learn from other countries' work.

Peru – Claudia Arndt

39. Peru has been unable to contribute recently to the IRG due to limitations on measuring emissions. Peru are looking to move to tier 2 reporting of dairy emissions, starting with the high Andes and Amazon region's systems. Peru has an interest in carbon sequestration in agricultural systems, implementation of best practice methods, financing options to enact climate smart changes, the effect of mitigation and adaptation practices on productivity, opportunities for livestock in a circular economy, and the development of MRV systems.
40. Currently funding for these types of projects comes from FONTAGRO²⁰, International Climate Initiative and AmSud²¹.

Poland – Malgorzata Slusarczyk

41. Poland has an interest in low carbon agriculture and has been involved in the H2020²² call and AFINET²³. Poland currently face a potential drought this year due to a lack of winter snowfall. There is a focus on multiannual research programmes, training agricultural advisers and the development of regional agricultural advisory centres. Recent work has involved preparing a strategic plan for the EU's new Common Agricultural Policy with a focus on water retention and renewables.
42. Current funding is provided through the Common Agricultural Policy, H2020 and the European Economic Area and Norway Grants. Poland is interested in exploring ways of working with IRG, and the inclusion of land use change and livestock in NDCs.

Spain – Alberto Sanz-Cobena

43. Spain is involved in many national and international GRA linked activities, including REMEDIA²⁴, circular food systems exploration, RedNueva²⁵, co-Chairing CRG, and research to show that

¹⁸ LEAP – Livestock Environmental Assessment and Performance Partnership

¹⁹ PLATON – Platform for Open and Nationally Accessible Climate Policy Knowledge

²⁰ FONTAGRO – Regional Fund for Agricultural Technology of Latin America

²¹ AmSud – A French South American cooperation programme

²² H2020 – European Union's Horizon 2020 programme

²³ AFINET – Agroforestry Innovation Network

²⁴ REMEDIA - Scientific network for the mitigation of greenhouse gas emissions in the agroforestry sector

²⁵ RedNueva – Network for Updating Emission Values in Spanish Agriculture

Mediterranean emission factors are different to the default tier 1 values. Spain has moved to tier 2 reporting for some components of their greenhouse gas inventory. Spain have been hosting international inventory training courses through CHEAM and have future courses coming up.

44. Spain has an interest in understanding what data can be shared around less studied conditions (such as N₂O emissions from Mediterranean soils) and how data can be included in IPCC guidelines to help other countries.

Switzerland - Daniel Bretscher

45. Switzerland has had limited involvement in the IRG so far but has a climate strategy of maintaining production while decreasing emissions. Their agricultural inventory is a combination of tier 2 and 3. Recent research²⁶ has shown cropland and grassland operating as carbon neutral, neither sink nor source. Switzerland have a high level of data covering their agricultural sector including grassland measurements and GHG modelling with ten years of data from over 300 farms. There is an intention to feed this data into a modelling system.
46. The Swiss NDC targets are ambitious. Policy makers are cautious about how changes will affect their economic situation in relation to their neighbouring trading markets. If it is shown that everyone has ambitious targets, then there is less risk to making bold positive decisions. They are also looking to be part of a global community providing support to MRV for soil carbon, enough to enable a triggering of a soil carbon market.

Netherlands – Peter Kuikman

47. Netherlands are increasing engagement in the IRG. They are constantly redeveloping their tier 2 and 3 inventory and methods. Netherlands have committed to a very ambitious agricultural climate programme, including identifying new solutions. Carbon sequestration is included in the national target and there is a strong reforestation programme. Climate change targets were agreed between Government, industry and non-governmental organisations, with the decision on actions to achieve these targets still to be agreed. Netherlands championed the creation of a circular agricultural network in the IRG. This is to be led initially by Henk van der Mheen.
48. As well as participating in EJP-Soil, future opportunities include:
 - “Smart Land Use”, which includes country specific GHG inventory preparation to account for actions and incentives towards implementation of mitigation options. These may include projects to improve soil carbon, incentives for farmers, monitoring progress, using data to understand trends and improving reporting.
 - Nitrogen Challenge (NH₃), dealing with ammonia emissions has both short-term and long-term impacts that will affect all aspects of Dutch life.
 - Public private partnerships on Sustainable Soil, with funding from Ministry of Agriculture.
 - National Programme on Agricultural Soils.

United Kingdom (UK) – Matthias Kuhnert

49. The UK has projects ranging in scale from the soil aggregate level to global modelling. Under the Natural Environment Research Council, the UK has the £1.8 million “Locked up” project, which looks at what makes carbon stable in soil aggregates. Other UK research includes looking at mitigation potential on croplands and how climate change and extreme events affect this potential, farm level management techniques, integrated regional scale ecosystem catchments

²⁶ Wüst et al. (2019), A model-based carbon inventory for national greenhouse gas reporting of mineral agricultural soils. Agroscope, 2019.

services (iCASP), and at the national scale, the Soils-R-GRREAT project using data analysis and lifecycle analysis to guide to consequential assessment.

50. The UK is looking to support projects in developing countries (particularly in Latin America and Africa). Opportunities exist through the Global Challenges Research fund. By leaving the EU, some funding opportunities have been lost. The UK will be able to continue to participate in EU projects, but funding support will now be paid by UK government. The UK have identified the IRG, and the wider community of the GRA as a way to remain connected to European Networks.

New Zealand – Hayden Montgomery

51. New Zealand has passed the Zero Carbon Act, which includes long-term emissions reductions targets and has split targets between short-lived and long-lived greenhouse gases. They New Zealand has established an independent Climate Change Commission to provide politically independent advice to the Government. Recent Government and industry agreements set a framework to establish farm level emission quantification, which will enable farm level carbon pricing. Due to high base levels of carbon in soil, soil carbon research in New Zealand focuses on retention rather than improving carbon stocks.
52. New Zealand has a focus on working with other countries and organisations and providing guidance around managing agricultural emissions relevant to more than just New Zealand. A 12-year national soil carbon monitoring programme commenced in 2019. Researchers are working with FONTAGRO to establish similar monitoring programmes in Latin America. New Zealand has been involved in supporting inventory improvements in Kenya, China and Indonesia, with future work planned with Australia in the Pacific, Africa and Asia. New Zealand is looking to collaborate with other international funders to identify opportunities for working towards the aims of the GRA.

CGIAR – Lieven Claessens

53. Based predominantly in the “global south”, CGIAR is a partner of the GRA and has 15 research centres around the world. CGIAR have 12 research programmes, with CCAFS the most closely aligned to the GRA. CCAFS’s flagship research focuses on low emissions development; climate smart technologies, practices, priorities and policies; climate services; scaling climate smart agriculture; and gender and social inclusion. CGIAR help to represent countries unable to attend meetings such as the IRG annual meeting. CGIAR’s CCFAS programme partners with the GRA to deliver the CLIFF-GRADS programme and has close links with the ILRI²⁷ research centre in Kenya.
54. With the CCAFS programme coming to an end, the focus of their work related to greenhouse gas emissions will shift towards adaptation, under the Two Degree Initiative for Food and Agriculture. Links between the Two Degree Initiative and IRG will likely be due to the co-benefits of adaptation and mitigation.

BREAKOUT SESSIONS

Soil Carbon Sequestration Network – Cristina Arias-Navarro

55. Discussion in the breakout session considered what the work plan of the Network would be for the coming year. A series of webinars was proposed with Teresa Gomez de la Barcena providing the first one on biochar, Rémi Cardinael providing two (one on deep rooting systems in agroforestry), Mike Grundy one and one in consultation with the CRG on peat soils.

²⁷ ILRI – International Livestock Research Institute

56. Remote sensing, and the challenges involved, was a topic that was raised many times throughout the IRG meeting. During the breakout session, a remote sensing workforce was proposed to explore how this technology could be best used. First steps include identifying a lead for the group and then developing a plan for exploring this technology.
57. Three publication ideas were shared:
- A research article on the mitigation options related to different soil types (Matthias Kuhnert);
 - The components of a monetary system for soil carbon (Jean-François Soussana); and
 - An extension of the work on incorporation of soil organic carbon in NDCs.

Farm to Regional Scale Integration Network – Pamela Joesse

58. The scope of this network had been queried during the wider meeting. Discussion of this clarified that the scope is that farm to regional scale can be up to a very large scale. In turn, this leads to opportunities to collaborate and members should look at how they can share ideas, activities and information, and build connections across the network.
59. Two webinars were proposed to be carried out in the coming year:
- National scale modelling around NDC modelling and related policy impacts and gaps
 - How different scales of models are being used to support agricultural inventories
60. A joint AGMIP/GRA project on co-benefits of mitigation and adaptation has been proposed. As part of these discussions, a workshop on the side of the AGMIP annual meeting was suggested. This would be an opportunity to gather a group of related modellers together to collaborate on this topic that affects both AGMIP and the GRA.

Greenhouse Gas Inventories and NDCs support Network – Richard Eckard

61. Conversation focused on two key issues:
- Transparency around agricultural inventory and NDC capability building work that has been done and what is still required; and
 - The advantage of having consistency in inventory tools and calculation templates.
62. There is a lack of understanding across the Network of the sum of the work that has happened or is happening, across the world, to support capability building in NDCs and Inventory compilation. This is causing overlap in the scope of some projects, and opportunities are being missed. A stocktake of current and planned capability building efforts was proposed. The 4p1000 initiative offered to host this stocktake information on their website. It was noted that this could build on work already carried out by the UNFCCC.
63. The use of consultants to deliver inventories and shape NDCs was raised as an issue due to knowledge not being retained in inventory and NDC coordinating institutions. There is a missed opportunity to upskill people in-country and a loss of expertise when the consultant finishes. It was observed that the increase in frequency to biennial reporting might result in more countries establishing and upskilling permanent teams for NDC and Inventory management.
64. Additionally, the idea of creating an Inventory and NDC “support hub” has been considered by many meeting attendees. Potential formats could include a forum of experts, a mailing list, or FAQs based on IPCC message boards. The LRG are also considering something similar. It was decided that participants should think further on how to design and fund this product in a way that is effective and links with other ideas being explored within the GRA.

Circular Food Systems Network – Henk van der Mheen

65. Discussion in this breakout session was around the scope and focus for the new Network. Work over the next year includes establishing and enlarging the Network; defining the focus, objectives, concepts and practices regarding Circular Food Systems; developing a research agenda; and preparing a review paper on the current situation.
66. Scope discussions looked at how far down the supply chain the Network would consider (e.g. farm inputs through to consumer), the scale of the systems (farm, regional and global) and the types of product it would produce. It was established that a baseline of the current use of circularity in agricultural systems and the work that has already gone into this idea, would be one of the first things required. This may involve a need to work across other Networks and Research Groups of the GRA. It was noted that establishing what the Network will do and starting that is more important than organising an optimal formal leadership structure at this stage.

FUTURE CONSIDERATIONS FOR THE NETWORKS

67. Recently, IRG has been closely tied with CIRCASA through both linked work programmes and leadership. CIRCASA funding moving to a new phase as the project becomes an International Research Cooperation (IRC) on soil carbon. It is intended that that IRG and the new IRC will continue to have aligned work programmes.
68. Technology for remote sensing research is reaching a level where it needs validating through extensive comparison with measured data under a range of scenarios. A potential source of the funding required for this could be through EJP-Soil.
69. The Farm to Regional Scale Integration Network is currently looking for a new network lead. Attendees were asked to consider who might be possible candidates to fill this role. If there is no leadership, the activities of this network may be picked up by other aligned networks. New Zealand committed to aiding the organisation of a Network linked workshop.

OTHER INITIATIVES FROM THE JOINT IRG-CIRCASA SESSION

70. Following the IRG meeting, CIRCASA hosted their second annual meeting with the first session dedicated to initiatives either partnered to the GRA or with links to both IRG and CIRCASA. Representatives from these groups presented on their initiatives.

4per1000 – Paul Luu

71. The initiative provided a refresher for attendees on their vision, how they operate and potential shared areas for collaboration. They also reached out to attendees about how the initiative could better link into other projects and initiatives. 4p1000 aims to provide advocacy at all levels around how agricultural soils can play a crucial role in food security and climate change challenges.

AgMIP – Erik Mencos Contreras

72. AgMIP is a network of more than 1000 modellers who carry out stakeholder driven research programmes. They cover a wide range of agricultural and climate change models. AgMIP has strengths in adaptation but looks at the co-benefits of mitigation and adaptation. A current

project they are working on is for DFID²⁸ and reaches over sub-Saharan Africa and southern Asia. The possibility of GRA related side meetings at their annual meeting (AgMIP8) was proposed. This was to be held in October in New York but will have to be re-visited in light of COVID-19 impacts.

European Joint Programme: Soils – Claire Chenu

73. EJP Soils is a European initiative with both internal and external calls proposed. There are 24 member EU countries, who each have a nominated agency to represent them. Activities will focus on research, education and training, support for harmonised information, and reporting. There is a budget of €40 million from the EU and €40 million provided as in-kind support by agencies. There are overlaps in scope with both the GRA and CIRCASA, providing potential for areas of collaboration. The first internal call is expected to open late June 2020.

²⁸ DFID – United Kingdom’s Department for International Development

APPENDIX 1: Participants List

Country	Attendees
GRA Member Countries	
Australia	<ul style="list-style-type: none"> - Beverley Henry (ACIAR) - Mike Grundy (CSIRO) - Richard Eckard (University of Melbourne)
Canada	<ul style="list-style-type: none"> - Pamela Joose (Agriculture and Agri-Food Canada)
France	<ul style="list-style-type: none"> - Claire Chenu (INRAE) - Cristina Arias-Navarro (INRAE) - Jean-François Soussana (INRAE) - Raoul Mille (INRAE) - Rémi Cardinael (CIRAD) - Suzanne Reynders (INRAE/Climate-KIC)
Ireland	<ul style="list-style-type: none"> - Karl Richards (Teagasc)
Netherlands	<ul style="list-style-type: none"> - Arthur Denneman (Statistics Netherlands) - Carla Boonstra (Ministry of Agriculture) - Henk van der Mheen (Wageningen University and Research) - Jan Verhagen (Wageningen University and Research) - Martin Scholten (Wageningen University and Research) - Peter Kuikman (Wageningen University and Research) - Saskia Visser (Wageningen University and Research) - Simon Oooting - Sjoerd Schenau (Statistics Netherlands)
New Zealand	<ul style="list-style-type: none"> - Marta Camps-Arbestain (Massey University)
Norway	<ul style="list-style-type: none"> - Teresa Gomez de la Barcena (Norwegian Institute of Bioeconomy Research)
Peru	<ul style="list-style-type: none"> - Claudia Arndt (National Agrarian University La Molina)
Poland	<ul style="list-style-type: none"> - Malgorzata Slusarczyk (Ministry of Agriculture and Rural Development)
Spain	<ul style="list-style-type: none"> - Alberto Sanz-Cobena (Universidad Politécnica de Madrid) - Jorge Alvaro-Fuentes (Spanish National Research Council) - Maria Jose Sanz (BC-3 Basque Centre for Climate Change)
Switzerland	<ul style="list-style-type: none"> - Daniel Bretscher (Agroscope)
United Kingdom	<ul style="list-style-type: none"> - Matthias Kuhnert (University of Aberdeen)
United States of America	<ul style="list-style-type: none"> - Tom Wirth (US Environmental Protection Agency)
GRA Partner Organisations	
4per1000	<ul style="list-style-type: none"> - Paul Luu
AgMIP	<ul style="list-style-type: none"> - Erik Mencos Contreras (Columbia University) - Roberto Valdivia (Oregon State University)
CGIAR	<ul style="list-style-type: none"> - Lieven Claessens
FAO	<ul style="list-style-type: none"> - Şeyda Özkan
ISRIC	<ul style="list-style-type: none"> - Hendrik van den Bosch
Other Participants	
Ecologic Institute	<ul style="list-style-type: none"> - Irina Herb
International Institute for Applied Systems Analysis	<ul style="list-style-type: none"> - Petr Havlik
Madagascar	<ul style="list-style-type: none"> - Herintsitohaina Razakamanarivo (University of Antananarivo) - Tantely Razafimbelo (University of Antananarivo)

GRA Secretariat	<ul style="list-style-type: none">- Hayden Montgomery (Special Representative)- William Aitkenhead (Secretariat)
Apologies	<ul style="list-style-type: none">- China and Italy

APPENDIX 2: Flagship project submission template

Title:

Leader:

GRA Council Champions: *list the names of at least 5 GRA Members and Partners (including at least 3 Member countries)*

- 1.
- 2.
- 3.
- 4.
- 5.

Countries involved:

Start date and project length:

Brief description of project:

Key partners and existing resources:

Benefits and outcome from Flagship project:

Further Resourcing needs:

Resourcing mechanisms:

Linkages:

Flagship Criteria

Project Scope

1. Project timeline (defined end date) specified.
2. Project outcome defined.
3. Globally applicable.

Project Participation

4. Benefits from GRA wide collaboration.
5. Provides a range of collaboration opportunities – including low cost e.g. data, sample or knowledge sharing.

Research

6. Will the project generate new knowledge, high scientific impact.
7. Identified community of experts within the GRA Membership (i.e. proposed by a Research Group or Network – or key coordinators identified if cross-cutting).

Resourcing

8. Flagship project lead identified.
9. Funding confirmed for Flagship project lead and core project activities (Minimum 30%, cash or in kind contributions of total project costs).

10. Proposed funding mechanisms for additional activities and contributions identified (i.e. fellowship fund, workshop funding, or research call).

Proposed Process

1. GRA Flagship Project template to be completed by the lead.
2. The GRA Flagship Project must identify at least five Council Champions, Members and Partners, consisting of at least three GRA Member countries.
3. Council representatives to assess proposed Flagship projects using the criteria (below), and agree on the GRA Flagship projects to endorse.
4. GRA Flagship Projects will be profiled on the GRA website, and once complete final outcomes will be presented to the Council.

Example GRA Activity relevant as Flagship Project

Some examples of projects that would meet the GRA Flagship criteria follow.

Global Rumen Census

The GRC is the most extensive exploration of rumen microbial communities to date, representing 742 samples from 32 animal species from 35 countries, and supported by 140 scientists from 73 research institutions worldwide. A key finding of the GRC was that similar bacteria and archaea dominated in nearly all samples, and that diet is a key driver of microbial-community structure. The GRC was a collaboration among members of the Rumen Microbial Genomics Network (www.rmgnetwork.org).

Hungate1000

Building on the results of the GRC, the Hungate1000 project used the culture resources of multiple rumen microbiology laboratories around the world (57 researchers, from 14 research organisations in nine countries) to develop a reference set of 501 rumen-microbial genome sequences and cultures. The Hungate1000 has captured almost all cultured rumen bacterial and archaeal species that have been taxonomically characterized and several as yet uncharacterized strains belonging to novel species and genera. It represents the single largest effort to provide a catalogued and curated culture and genome resource for rumen microbes. The Hungate1000 was a collaboration among members of the Rumen Microbial Genomics Network (www.rmgnetwork.org).

MAGGnet

In 2012, a greenhouse gas research network referred to as MAGGnet was established within the Croplands Research Group of the Global Research Alliance on Agricultural Greenhouse Gases (GRA). With involvement from 46 alliance member countries, MAGGnet seeks to provide a platform for the inventory and analysis of agricultural greenhouse gas mitigation research throughout the world. To date, metadata from 315 experimental studies in 20 countries have been compiled using a standardized spreadsheet.

MAGGnet has served to leverage limited resource investments within individual countries to produce an inclusive, shared meta-database for use by all GRA-member countries. MAGGnet occupies a unique niche among greenhouse gas networks given its geographical domain (global) and intended focus. With time and continued effort, MAGGnet can serve to further greenhouse gas mitigation science through new collaborations among contributing members.

<https://www.tandfonline.com/doi/full/10.1080/17583004.2016.1180586>

CEDERS

Known as 'CEDERS', this new project aims to: develop databases to evaluate dietary mitigation strategies (including digestion and excretion) and greenhouse gas emissions and undertake experiments to fill high-priority knowledge gaps on dietary effects on ruminant manure emissions. It will evaluate consequences of dietary mitigation measures on emissions on selected farm cases with a modelling platform, improve farm accounting and national inventory methodologies to capture effects of dietary mitigation measures and disseminate the implications of findings to end-users of greenhouse gas accounting and inventory.

CEDERS initially involved scientists from 10 countries and is being expanded to include Post-Docs in Latin America and South East Asia to increase its global relevance. This additional work will help identify region-specific feeds that could feasibly offer the most significant emissions reductions and develop Ym values for specific feeds suitable for inclusion in advanced national greenhouse gas inventories to help better quantify enteric methane emissions and, specifically, capture the impact of local diets and changes in diets on emissions.