Submission by the North America Climate Smart Agriculture Alliance

In Response to Decision 4/CP.23

Koronivia Joint Work on Agriculture

Topics 2(b) and 2(c)

May 5, 2019

The North America Climate Smart Agriculture Alliance welcomes the opportunity to submit its views and recommendations regarding topics 2(b) "methods and approaches for assessing adaptation, adaptation co-benefits and resilience" and 2(c) "improved soil carbon, soil health and soil fertility under grassland and cropland as well as integrated systems, including water management" under the Koronivia Joint Work on Agriculture.

The North America Climate Smart Agriculture Alliance (NACSAA) is a farmer-led platform for inspiring, educating, and equipping agricultural partners to innovate effective local adaptations that sustain productivity, enhance climate resilience, and contribute to the local and global goals for sustainable development. NACSAA reflects and embraces all scales of agriculture in Canada, Mexico and the United States, ranging from small landholders to midsize and large-scale producers. NACSAA encourages the use of climate smart agriculture (CSA) practices to enhance the adaptive capacity of North American agriculture to changing climate conditions, and works to achieve this goal through three complementary strategies: 1) sustainably increasing agricultural productivity and livelihoods (i.e. sustainable intensification); 2) enhancing adaptive capacity and improving resilience; and 3) delivering ecosystem services, sequestering carbon, and reducing and/or avoiding greenhouse gas emissions.

Climate Challenges and Opportunities for Agriculture

It is well documented that climate change will have profound negative impacts on agricultural systems across the globe. While some regions will experience disruptions requiring transformational change in what and how food is produced, all continents and regions will experience food and nutrition security challenges.

According to the IPPC Global Warming of 1.5 ºC report, "the effects of climate change on crop yield, cultivation area, presence of pests, food price and supplies are projected to have major implications for sustainable development, poverty eradication, inequality and the ability of the international community to meet the United Nations sustainable development goals[1]."

[1] Hijioka, S. Mehrotra, A. Payne, S.I. Seneviratne, A. Thomas, R. Warren, and G. Zhou, 2018: Impacts of 1.5ºC Global Warming on Natural and Human Systems. In: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the*

Here in North America, the Fourth National Climate Assessment Report, Volume II, produced by the U.S. Global Change Research Program, confirms that climate change presents numerous challenges to sustaining and enhancing crop productivity, livestock health, and the economic vitality of rural communities in the United States. Among the report's key messages:

"Rising temperatures, extreme heat, drought, wildfire on rangelands, and heavy downpours are expected to increasingly disrupt agricultural productivity in the United States. Expected increases in challenges to livestock health, declines in crop yields and quality, and changes in extreme events in the United States and abroad threaten rural livelihoods, sustainable food security, and price stability.[2]"

The IPCC and related scientific reports make clear that there is a growing threat to how we produce food, feed, fiber, energy and ecosystem services and that the time for action is now. In response to these threats, government agencies, academic institutions, businesses and public private sector collaboratives such as the Global Alliance for Climate Smart Agriculture and NACSAA are mobilizing to help farmers sustainably increase agricultural productivity and livelihoods, enhance adaptive capacity and improve resilience; and simultaneously deliver ecosystem services, sequester carbon, and reduce and/or avoid greenhouse gas emissions. Efforts such as these should be encouraged and supported in all regions of the world.

Guiding Principles for KJWA

The North America Climate Smart Agriculture Alliance recommends that the following guiding principles be respected in the formation of the Koronivia Joint Work on Agriculture:

- As affirmed in the communique from the 8th Meeting of G20 Agricultural Chief Scientists (MACS), science-based decision making should be the foundation for the adoption of climate smart technologies and practices for sustainable agriculture and global food production[3].

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context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]; p.238. In Press.

[2] Gowda, P., J.L. Steiner, C. Olson, M. Boggess, T. Farrigan, and M.A. Grusak, 2018: Agriculture and Rural Communities. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 391–437. doi: 10.7930/NCA4.2018.CH10

[3] G20 Japan. *8th Meeting of Agricultural Chief Scientists (MACS) Communiqué* [Press Release]. (2019). Retrieved from http://www.affrc.maff.go.jp/docs/press/attach/pdf/190427-3.pdf

- Production and production efficiency per unit of land must increase going forward to meet the food needs of the future while incurring no net environmental cost[4,5].
- As reflected in the Sustainable Development Goals (SDGs) of the United Nations, outcomes (rather than means) applicable to any scale of enterprise must be emphasized, without predetermining technologies, production type or design components[3].
- Adaptation strategies must be recognized to require system approaches[6] that utilize a combination of improved efficiency, substitution (e.g. new crop varieties and breeds), and redesign/system transformation to reflexively respond to continuous short- and long-term changes in climate's impacts on cultivated and natural ecosystem conditions.
- Peer reviewed academic, business and farmer climate smart agriculture research and knowledge sharing recommendations outside of the UNFCCC should be considered by the SBI and SBSTA and integrated into the final KJWA report.
- There is no silver bullet solution for enhancing the resilience agriculture: KJWA must embrace a systems approach that recognizes the tremendous diversity of agricultural landscapes and ecosystems and enables producers to utilize the systems and practices that best support their farming operations.
- Farmers must be at the center of all discussions and decision-making; significant input will be needed from a wide range of agricultural stakeholders, including technical agricultural experts drawn from farmer organizations, academia, industry, and international and regional organizations, especially those outside of the UNFCCC structure.
- Context-specific priorities and solutions must be aligned with national policies and priorities, be determined based on the social, economic, and environmental conditions at site (including the diversity in type and scale of agricultural activity), and be subject to evaluation of potential synergies, tradeoffs, and net benefits[7].

<u>Methods and Approaches for Assessing Adaptation, Adaptation Co-Benefits and Resilience</u>

Assessment of adaptation capacity, risk, and vulnerability must be based upon rigorous scientific methods for reviewing these issues, as the assessment becomes the basis for actions to hedge against risks. A good science-based reference for this requirement is the 2012 USDA Technical Bulletin 1935, "*Climate Change and Agriculture in the United States: Effects*

[4] J. Pretty, 2918 Intensification for redesigned and sustainable agricultural systems. Science 362,eaav0294 doi 10.1126/science.aav0294

[5] BM Campbell, P. Thornton, R. Zougmore, P van Asten, L. Lipper. 2014. Sustainable intensification: What is its role in climate smart agriculture? Current Opinion in Environmental Sustainability 8:39-43

[6] P Tittonell. 2014. Ecological intensification of agriculture. Current Opinion in Environmental Sustainable 8:53-61

[7] North American Climate Smart Agriculture Alliance (2015). *A platform for knowledge sharing and application of climate science to agriculture* [Report]. Retrieved from: https://www.sfldialogue.net/files/sfl_formation_plan_2015.pdf

and Adaptation[8]," which links changing climate effects on US crop and animal agriculture to adaption strategies and approaches (including economic, environmental and social effects of adaptive management choices).

The starting point in developing adaptive management strategies should be the completion of a vulnerability assessment that can be used to identify and prioritize adaptation options. A useful framework for discovering and documenting climate hazards and vulnerabilities includes the following steps: 1) explore hazards; 2) assess vulnerability and risks; 3) investigate options; 4) prioritize and plan; and 5) take action. NACSAA endorses and recommends the US Climate Resilience Toolkit[9] for conducting vulnerability assessments.

Once a vulnerability assessment is completed for a country, region, commodity or climate, adaptation strategies can be formulated to help producers adapt to changing climatic conditions and enhance resilience. Adaptation strategies come in many different forms, but typically fall into three major categories: actions to increase resistance to changes in climate in order to maintain existing systems and practices; actions to improve resilience by investing in steps that preempt negative impacts and restore systems in the wake of them; and actions to transform operations. Examples include planting drought-resistant hybrids to resist the impacts of decreased precipitation; extending rotations of corn and soybeans to include wheat and cover crops to build resilience to extreme weather; and diversifying production systems to incorporate ecosystem services that would transform the landscape and protect producer incomes in the face of significant changes in climate[10].

The United States Department of Agriculture's USDA Adaptation Resources for Agriculture[11] is a valuable technical bulletin containing information and resources designed to help agricultural producers, service providers, and educators integrate climate change considerations and action-oriented decisions into existing farm and conservation plans. While its focus is on the Midwest and Northeast regions of the United States, the strategies it outlines can be adapted for use in other regions or continents across the globe. NACSAA recommends that this bulletin be included among the tools in KJWA resource library.

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[8] Rivington, Mike & Walthall, Charlie. (2012). Climate Change and Agriculture in the United States: Effects and Adaptation. Walthall et al USDA Technical Bulletin 1935.

[9] U.S. Federal Government, 2014: U.S. Climate Resilience Toolkit. [Online] http://toolkit.climate.gov. Accessed May 2, 2019.

[10] 25x'25 Alliance (2013). *Ag and forestry in a changing climate: Adaptation Recommendations* [Report]. Retrieved from: http://www.25x25.org/storage/25x25/documents/Adaptation/agriculture_and_forestry_in_a_changing_climate_-_adaptation_recommendations.pdf

[11] U.S. Department of Agriculture (2016). Adaptation Resources for Agriculture: Responding to Climate Variability and Change in the Midwest and Northeast. Janowiak et al USDA Technical Bulletin 1944.

NACSAA also recommends that the KJWA articulate desired outcomes from the development of vulnerably assessments and adaptive management strategies. Examples we would like to see included follow:

- An inspired, locally based constituency advances CSA national outcomes to meet local needs, champions CSA solutions, embraces multi-stakeholder collaboration and peer-to-peer learning about climate science, and utilizes CSA technologies and practices;
- Policies and programs that assist producers in implementing locally appropriate CSA systems and practices are proposed, informed by science and vetted by local collaboratives, as well as supported by national leaders;
- Farmers and their partners identify and implement CSA practices in ways that allow landscapes to produce the full range of climate-smart ecosystem services;
- Producer and service provider innovations are unleashed at the local, national, and global levels, and then collected, curated, widely distributed and made easily accessible to producers and their partners; and
- Productivity is increasing, year-to-year variability is decreasing, production systems are becoming more resilient, and farmers are delivering near-term, high-value, climate solutions.

Improved Soil Carbon, Soil Health, and Soil Fertility

In humanity's race to avoid catastrophic impacts from global climate change, the world needs a major contribution from "negative emissions"—especially greater uptake and storage of carbon by natural systems. The agricultural sector has multiple opportunities to contribute[12,13,14] to this goal by applying scientifically based principles coupled with policy to promote and support these strategies. Enhancing soil carbon and maintaining soil fertility are the foundation of soil health, and climate resilient agricultural systems will increase the overall stability and efficiency of the agricultural sector. Fostering the implementation of practices that increase the uptake and storage of carbon into the system will pay dividends for both the climate and food security while delivering multiple ecosystem service co-benefits. For example, increasing soil carbon sequestration for climate increases soil organic matter which can enhance nutrient cycling, water retention and infiltration, support soil biodiversity, and increase crop productivity and climate resilience.

These systems share the following general attributes:

- Increased diversity of plants on the soil;
- Increased time of crop or residue cover on the soil surface;

[12] Zomer R J, Bossio D A, Sommer R and Verchot L V 2017 Global sequestration potential of increased organic carbon in cropland soils Sci. Rep. 7 1–8

[13] Lal, Rattan. (2019). Conceptual basis of managing soil carbon: Inspired by nature and driven by science. Journal of Soil and Water Conservation. 74. 29A-34A. 10.2489/jswc.74.2.29A.

[14] The White House. Storing Carbon and Reducing Emissions with US Lands, in United States Mid-Century Strategy for Deep Decarbonization; The White House: Washington, DC, USA, 2016.

- Reduction in the intensity of tillage;
- Enhanced management of nutrients and water to promote plant growth,
- Utilization of appropriate, precise land-based applications of animal manures;
- Judicious use of livestock systems to convert forages into meat and milk; and
- Management practices that increase the nutritional quality of raw agricultural products.

Plant nutrition management is an especially important and proven method for improving soil carbon, soil health and soil fertility. NACSAA joins with the International Fertilizer Association in promoting the adoption of Integrated Plant Nutrient Management and the use of the "4R" global framework of nutrient stewardship (using the right nutrient source at the right rate, time and place) to ensure optimal nutrient use efficiency, increases in soil organic content and reductions in greenhouse gases from managed soils.

To accelerate and scale up the adoption of proven systems, practices and technologies for improving soil carbon, soil health and soil fertility, properly structured enabling policies and mechanisms (including investments in technical support, practice-based incentive payment programs, development of ecosystems service markets, farmer-to-farmer knowledge sharing and extension programs, among others) are required. NACSAA takes note of and endorses the Soil Health Challenge[15] announced at the Global Climate Action Summit held in September, 2018 in San Francisco, California. The Soil Health Challenge, issued by California Secretary of Agriculture Karen Ross, calls on national and sub-national governments to promote the development of healthy soils within their own geographies and to report back on progress at future UN Climate Summits.

NACSAA is especially supportive of the framework outlined in the challenge, which calls for nations to include ambitious programs on soil health in their Nationally Determined Contributions (NDCs), and for sub-national climate initiatives to include robust soil heath programs. Both should include a range of proven, science-based actions and systems, as well as agricultural practices appropriate to diverse geographies and landscapes, based on emerging soil science – to include planting cover crops, adopting low- or no-till farming practices, rotational grazing, generation and use of safe compost and/or biochar, crop rotations, nutrient management, silvopasture, agroforestry and other practices.

The FAO's 2017 Voluntary Guidelines on Sustainable Soil Management[16] is a valuable resource outlining ways soils should be sustainably managed to properly deliver ecosystem services while halting degradation. NACSAA endorses its inclusion in the KJWA resource library.

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[15] California Department of Food and Agriculture. (2018) *Global Soil Health Challenge* [Pre-release]. Retrieved from https://www.sfldialogue.net/files/News/Global_Soil_Health_Challenge_2018.pdf

[16] FAO 2017. *Voluntary Guidelines for Sustainable Soil Management*. Food and Agriculture Organization of the United Nations. Rome, Italy.

North America Climate Smart Agriculture Alliance Partners
May 2019

- 25x'25 Alliance
- Advanced Biofuels USA
- Agricultural Retailers Association
- American Coalition for Ethanol
- American Farm Bureau Federation
- American Farmland Trust
- American Society of Agricultural and Biological Engineers
- American Society of Agronomy
- American Soybean Association
- Association of Equipment Manufacturers
- Association of Public and Land-Grant Universities
- Bayer
- BIO
- Business for Social Responsibility
- Canadian Federation of Agriculture
- Canadian Forage and Grassland Association
- CAST
- Cater Communications
- Center for Climate and Energy Solutions
- Conservation Technology Information Center
- Cornell Institute for Climate Smart Solutions
- Crop Science Society of America
- CropLife America
- EcoAgriculture Partners
- Environmental and Energy Study Institute
- Environmental Defense Fund
- Family Farm Alliance
- Farm Foundation
- Farm Journal Foundation
- Farm Management Canada
- Fertilizer Canada
- Field to Market
- Florida Climate Institute (FCI)
- Genscape Inc. /University of Illinois at Chicago
- ILSI Research Foundation
- Innovation Center for U.S. Dairy
- Iowa Soybean Association
- Iowa State University
- Irrigation Association
- Kellogg Company
- National Association of Conservation Districts
- National Corn Growers Association
- National Farmers Union
- National FFA Foundation
- National Pork Producers Council
- Native Pollinators in Agriculture Project
- Ontario Federation of Agriculture
- Soil Science Society of America
- Soil and Water Conservation Society
- Solutions from the Land
- Southeast Climate Consortium (SECC)
- Sustainable Corn Coordinated Agriculture Project
- Syngenta
- The Fertilizer Institute
- The Samuel Smith Noble Foundation
- The Toro Company
- United Soybean Board
- University of Florida
- U.S. Department of Agriculture
- Western Growers Association
- World Business Council for Sustainable Development
- World Wildlife Fund