



# Carbon Management and Sequestration Center

Issue 2 | 2016



## Summer at C-MASC

The first official summer day of 2016 was greeted by a 3"-5" rainstorm on June 23<sup>rd</sup>, that flooded the Olentangy River with silt-laden and nutrient-enriched runoff from the eastern Corn Belt. Nitrate levels in city water supply tested at 10.5 ppm, too high for infants and pregnant women. The C-MASC envisages increase in intensity and frequency of extreme events (the flood-drought syndrome) over the coming decades. The amount of very heavy precipitation has increased between 1958 and 2007 over most of the U.S. However, specific increase in heavy precipitation in Ohio over this period is estimated at 31%. In addition to heavy precipitation, Ohio (and the Midwest) is also getting more humid throughout the summer. Thus, most summer days in Columbus are hot (85-90°F) and humid (>90% humidity). Maintaining a continuous vegetation cover (mulch and cover crop) is important to conserving runoff and sediment transport, reducing risks of non-point source pollution and toxic algal blooming, conserving soil water, reducing soil temperature, increasing soil carbon reserves, and creating climate-resilient soils. **Conservation agriculture, with mulching and cover cropping, are the gateways to "climate-smart" agriculture.**

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Prof. Lal visited the Federal University of Mato Grosso on 13<sup>th</sup> May 2016. He met with the Rector (Prof. Dr. Maria Lucia Cavalli Neder) and Vice Provost of International Programs (Prof. Dr. Paulo Teixeira de Sousa Jr.) along with many other faculty and students. (Continued on page 4)...



## Prof. Nyambilia Amuri Visits April 2016

Dr. Nyambilia Amuri from Sokoine University of Agriculture (SUA), Morogoro, Tanzania, presented a seminar on soil fertility in east Africa to C-MASC and the Office of International Agriculture. Prof. Amuri received her PhD in Crop, Soil, and Environmental Science from the University of Arkansas in 2008, and has been a lecturer at the SUA for the past 8 years. She has 36 published book chapters, journal articles, conference proceedings and extension booklets, and has supervised/co-supervised over 30 graduate students.

## Brandt Farm Visit April 2016



C-MASC Visiting Scholars, Prof. Nyambilia Amuri, and Wendi Howell and Dr. David Hansen of the International Programs in Agriculture visited Brandt Farm in Fairfield County to discuss no-till farming and other practices. David Brandt began no-till farming on his farm in 1971, and provided a demonstration for [Minster Stéphane Le Foll](#) when he visited C-MASC in June 2015.

Photographed above (left): Eduane de Padua, Huifang Han, Wendi Howell, Simi Mehta, Prof. Amuri, Muhammad Azhar, Dave Brandt, and Dr. Hansen.



**Spring Gathering  
OARDC Wooster Campus  
April 2016**

Dr. Lal and Visiting Scholars attended the Spring Gathering at the Stone House on the OARDC Wooster Campus. This annual event is a great opportunity to reconnect and network within the OARDC community. Dr. Jerry Bigham co-hosted the Spring Gathering, and also gave a tour of the OARDC and ATI facilities to the Visiting Scholars.

Photographed above: Dr. Rattan Lal, Muhammad Azhar (Pakistan), Dr. Ken Martin, Dr. Jerry Bigham, Dr. Warren Dick, Simi Mehta (India), Eduane de Padua (Brazil), Xin Zhao (China), and Huifang Han (China).

**Dr. Jayanta Layek**

ICAR Research Complex for NEH Region  
Umiam-793103, Meghalaya, India

Dr. Layek, scientist (Agronomy) has joined the C-MASC on 17<sup>th</sup> June 2016 to work on “Biochar: Impacts on soil physical quality and carbon dynamics” for one year as a visiting scholar. He has done his MSc (Agronomy) from Indian Agricultural Research Institute (IARI), India in 2008 and secured gold medal. He did his PhD from IARI, India with prestigious “Inspire Fellowship” for Department of Science and Technology, Govt. of India in year 2011. He also secured 1<sup>st</sup> rank in Agricultural Research service for the post of scientist in the discipline of Agronomy.



He has done significant research in the field of Natural Resource Management for Food and Environmental Security in North East Hill Region of India". His research focuses on improvement in shifting cultivation, conservation agriculture, sea weed sap evaluation, climate resilient agriculture and organic farming. He has published more than 20 research articles in reputed national and international journals. He sincerely acknowledges the Department of Biotechnology, Govt. of India, Indian Council of Agricultural research and C-MASC, OSU for providing this opportunity to work as a visiting scholar. This overseas associateship in C-MASC will provide the applicant an opportunity to identify possible positive impact of biochar on restoration of degraded land and replacement of shifting cultivation for sustainable intensification.



### Federal University of Mato Grosso Mato Gross, Brazil May 2016

Prof. Rattan Lal visited Federal University of Mato Grosso (UFMT) and presented lectures to students, and seminars at the Sinop and Cuaiba campuses. Prof. Lal was accompanied by Mr. Rodrigo Da Silva Viana Goncalves, a program assistant in the Ohio International Intern Program. In addition to visiting UFMT, Prof. Lal also visited EMBRAPAs Agrosilvopastoral Center in Sinop and discussed cooperation with Dr. Eduardo da Silva Matos and Dr. Marina Morales. During his visit, Prof. Lal explored the possibilities of cooperation between (*continued on page 5*)...



Seminar at Sinop on 9<sup>th</sup> May entitled, "Environment and Agriculture." (photographed top of page). Main entrance to the Sinop Campus (above left), left to right: Mr. Rodrigo Goncalves, Prof. Rogerio de Andrade Coimbra (coordinator of Agronomy courses), Prof. Lal, Prof. Daniel Abreu (Agric. & Env. Sciences), Dr. Marina Morales (EMBRAPA). Prof. Lal was extremely privileged to be accompanied by two police officers (above center) everywhere he visited during his stay. These officers were highly professional, and extremely polite, courteous, helpful and friendly. The seminar on the Cuiaba campus (12<sup>th</sup> May) was Chaired by Prof. Paulo de Teixeira, Jr. and attended by faculty, staff, students across the disciplines.



Federal University of Mato Grosso  
Mato Gross, Brazil



(continued from page 4) OSU and the UFMT by holding discussions with the Rector (Dr. Maria Lucia Cavalli Neder), Provost of the International Programs (Prof. Paulo Teixeira de Sousa, Jr.), Provost of the Sinop Campus (Prof. Dr. Frederico Terra de Almeida), Coordinator of the Agronomic Curricula (Prof. Rogerio de Andrade, Coimbra), and Prof. Daniel Abreu, (soil scientist). Prof. Lal visited the office of the Governor of Mato Grosso (Mr. Pedro Taques) and farmer associations. The visit funded by Mr. Michael Chrisman, Assistant Director of the Ohio International Intern Program, paves the way for a strong cooperation with the Federal University of Mato Grosso, and EMBRAPA. Both OSU and UFMT have opportunities of strengthening their programs through cooperation on topics of mutual interest.

Photographed top left, Rector Neder presented books on Brazil and Mato Grosso, and Chaired a meeting with faculty and staff (top right), which was broadcast live on the state television network.

The seminar at Sinop (upper left) with flags of Mato Grosso/ Brazil and the U.S., began with the national anthem of both countries.

A tour of the campus and laboratory facilities (photographed lower left) was conducted by Prof. Dr. Marco Antonio Araujo Pinto (3<sup>rd</sup> from left), Provost, Sinop Campus, and Frederico Terra de Almeida (2<sup>nd</sup> from right), Dean Sinop Campus.

EMBRAPA Sinop has some outstanding facilities to conduct field experiments (photographed bottom left) including the water budget studies. The experimental set up is being explained by Dr. Eduardo da Silva Matos (Assistant Director of Research and Development) (center) along with his colleague Dr. Marina Morales (left) and Dr. Daniel Abreu of UFMT (right).



## European Commission Brussels, Belgium

Prof. Lal participated in a workshop entitled "Land Related Climate Change and Mitigation Actions in Agriculture" held at DGAGRI in Brussels on 30-31 May 2016. The workshop, organized by the European Commission, involved three sessions: (1) Measuring and Monitoring the Land Related Mitigation Practices and Technologies, (2) Land Related Mitigation Practices and Technologies and, (3) How can the Previously Analyzed Mitigation Measures be Integrated into Policies. Prof. Lal made a presentation on "Sustainable Intensification" the the focus on producing more food from less input while reducing the environmental footprint.

## International Conference on Pulses for Health Marrakech, Morocco

Dr. Lal was as a keynote speaker at the ICARDA and INRA "International Conference on Pulses for Health" in Marrakech, Morocco. The conference provided a platform to various stakeholders to discuss the contributions of pulses to food and nutritional security and ecosystem health. Morocco is hosting COP22 Summit in November 2016. INRA-Morocco will organize a side workshop on soil carbon sequestration to mitigate climate change and advance food security. Being a member of the scientific committee for implementation of "4 per Thousand" program, Prof. Lal will liaise with colleagues in INRA-France and INRA-Morocco.

Photographed (right) Prof. Lal was presented a plaque by Prof. Muhammad Sadiki and Prof. Muhammad Badraoui of INRA, Morocco.





## World Bank Washington, D.C.

On June 7<sup>th</sup>, Prof. Lal participated in a conversational panel at the World Bank in Washington, D.C., discussing the role of Land Grant Universities in future development projects. The OSU team was represented by Dr. Mark Erbaugh and Prof. Rattan Lal. Themes of climate-smart agriculture and improving nutrition were among others discussed at the panel. The World Bank is taking an active role in implementing practices of climate-smart agriculture in all of its agricultural projects, and is giving a high priority to improving soil health and enhancing soil organic carbon reserves. A strong cooperation between the World Bank and Land Grant Universities will be mutually beneficial and create opportunities in human resources development, advancing food and nutritional security and adapting and mitigating climate change.

## GIFS Conference Saskatoon, Canada

Prof. Rattan Lal was an invited keynote speaker at the conference entitled, "Emerging Technologies for Food Security: Mobilization to the Developing World." The conference was organized by the Global Institute for Food Security of the University of Saskatchewan, from 14-16 June 2016, at Saskatoon, Canada. The title of his keynote presentation was "Soils and World Food Security." He was also invited to moderate a panel discussion on "Soil Health and Sustainability."

The Conference was attended by about 350 participants of >25 countries from around the world.





# UNU-FLORES International Advisory Committee Dresden, Germany June 2016

Prof. Rattan Lal, Chair of the International Advisory Committee of the UNU-FLORES, attended the 3rd meeting in Dresden, Germany on 30<sup>th</sup> June to 1<sup>st</sup> July. Seated in the photo from left to right are Dr. David Malone (Rector, UNU ,Tokyo; Undersecretary UN), Prof. Rattan Lal (Chair, AC, C-MASC, OSU), Dr. Karl-Heinz Feger (Dean, TUD), Dr. Wim Van Vierssen (Wageningen, Holland). Other members of AC are Dr. Anna Maria Mondjana (Moputo, Mozambique), Dr. A.C. Nardocci (USP, Brazil), and Dr. Reza Ardakanian (Director, UNU-FLORES, ex-officio).

## Wooster No-till Plots

Dr. Jose Guzman and the Visiting Scholars visited OSU Wooster Campus to the oldest no-tillage experimental plots. The Triplett-Van Doran plots were established in 1962.







## 2016 Global Food Security Symposium Washington, D.C April 2016

Ph.D student, [Nall Moonilall](#), was selected a Social Media Ambassador for the Global Food Security Symposium to represent the 2016 Next Generation Delegation. He describes his experience at this conference below:

The 2016 Global Food Security Symposium was held in Washington D.C. on April 26, 2016 and focused on the theme of Growing Food for Growing Cities: Transforming Food Systems in an Urbanizing World. It is estimated that by 2050, about two-thirds of the global population will reside in cities. Such a shift in population will require a transformation of the world's food systems. The Symposium consisted of several discussion themed sections focusing on 1.) Feeding the World: Urbanization and the Global Food System, 2.) Partnerships for Inclusive Growth, 3.) Cultivating a Sustainable and Resilient Food System, and 4.) Demand, Dietary Diversity, and Nutrition. Each discussion section contained a group of panelist discussing certain topics revolving around the overall theme of the discussion as well as others conversing on emerging solutions and other special remarks focused on the particular theme. Lastly, the Symposium took a look at the annual report that coincided with the overall theme of this year's symposium.

Serving as a Social Media Ambassador as part of the Next Generation Delegation was a very rewarding experience. We were tasked with sharing key pieces of information being discussed throughout the symposium on various social media platforms so that there could be global engagement and discussion about the topic of food security. Furthermore, as a Social Media Ambassador, we had the opportunity to meet and speak with different guest speakers and professionals as well as engage with other Social Media Ambassadors and Next Generation Delegates. The 2016 Global Food Security Symposium was a truly a splendid day filled with great dialogue and discussion focused around food security.





Students and Graduates



**Ricardo Bordonal**  
São Paulo State University  
Brazil

Ricardo Bordonal defended his PhD thesis "Greenhouse Gas Balance Associated with Sugarcane Production in South-central Brazil, Considering the Management and Expansion" on February 3<sup>rd</sup>, 2016. He was visiting scholar at C-MASC in 2014 from São Paulo State University, Brazil.



**Reed Johnson**  
The Ohio State University

Reed Johnson graduated with his M.Sc degree in May 2016. His thesis, "On-Farm Assessment of Soil Properties under Different Management Practices in West-Central Ohio" was the product of research on the CS-CAP project.



**Sajid Hussain**  
Faisalabad Agriculture University  
Pakistan

Sajid Hussain, a Visiting Scholar from October 2015-March 2016, successfully defended his PhD thesis in May 2016 at the University of Agriculture, Faisalabad, Punjab, Pakistan.



**Pat Bell**  
The Ohio State University

Pat Bell, presented his Ph.D dissertation, "Sustainable Intensification for Food Security and Climate Change Adaptation in Tanzania" at his final Doctoral Examination. He is presently revising his thesis and plans to graduate in August 2016.

**Chris Eidson**  
The Ohio State University

In January 2017, Chris Eidson will be taking over as Agronomist/Laboratory Specialist at Brookside Laboratories, Inc. He received his masters at OSU (Soil quality and corn-soybean yields as affected by winter rye cover in the Midwest) with a minor in statistics. Chris will be completing his PhD thesis during his first few months at Brookside. Chris's research has been mainly in the areas of soil quality, phosphorus indexing/water quality, and crop residue removal for biofuels. Chris has assisted in teaching important classes at OSU (Soil Physics Lab, Soil Science Lab, and Forest Ecosystem Management) which will greatly help him with his role here at Brookside.

*Congratulations Chris!*





## Alumni and Awards

### **Sindhu Jagadamma, Ph. D.**

**Assistant Professor**

**Department of Biosystems Engineering & Soil Science**

**The University of Tennessee**

[sjagada1@utk.edu](mailto:sjagada1@utk.edu)

C-MASC alumna Sindhu Jagadamma has been appointed as a tenure-track faculty at the University of Tennessee (UT). Sindhu began her role as Assistant Professor in the UT Institute of Agriculture's Biosystems Engineering and Soil Science (BESS) department on April 1, 2016

Sindhu was a graduate student at C-MASC from 2003 to 2009, and completed her MS and PhD degrees with a Soil Management focus. After a stint as a postdoctoral researcher at Ohio Agricultural Research and Development Center under the supervision of Prof. Warren Dick, Sindhu secured another postdoctoral position at Oak Ridge National Laboratory (ORNL). At ORNL, Sindhu got the opportunity to study the mechanistic processes at the interface of

soil organic matter and minerals using state-of-the-art techniques including neutron reflectometry. She also studied microbial processing of soil carbon in response to changing climate. She was the recipient of ORNL's Environmental Sciences Division's Outstanding Postgraduate Researcher Award in 2013. Sindhu also got the opportunity to investigate the coupled hydrological-geochemical-microbiological processes that control the degradation of contaminants from groundwater and sediments.

Sindhu is very excited about her new position at BESS, UT. She will be focusing on developing an internationally recognized research program on soil and nutrient management for sustainable crop production. Sindhu gives credit to C-MASC and ORNL for shaping her career to secure an academic position. Sindhu is looking forward to start collaborative research opportunities with C-MASC community.



### **Dr. Anup Das**

**ICAR Research Complex**

**Umiam, Meghalaya, India**

C-MASC Alumnus, Dr. Anup Das, is a Senior Scientist (Agronomy) at ICAR research Complex for NEH Region, Umiam, Meghalaya, India. He has been promoted to Principal Scientist through career assessment WEF. 8 Sept, 2016. He is also in-charge and Head, Division of Crops Production of the Institute. Dr. Das was a Visiting Scholar at CMASC, OSU from 15 Oct, 2013 to 15 Jan, 2014, and continues to be a strong cooperator of C-MASC. He has made significant contributions in the field of Natural Resource Management on "Conceptualization and Development of Demand Driven Conservation Agriculture Technologies for Ensuring Food Security in Fragile Ecosystem of North East India". He evaluated and standardized package of practices

for no-till production of pulses and oilseeds in rice and maize fallow utilizing residual soil moisture; developed organic package of practices for 11 important crops and standardized organic farming system models for both valley land and upland/sloping lands. Dr Das also worked on modified system of rice intensification and rice ratooning. Worked extensively across the NEH region for livelihood improvement of tribal and marginal farmers in collaboration with Universities, CGIAR institutes (IWMI/ILRI) and state govt. functionaries. He has mentored several M.Sc. students. Coordinated several training programmes for farmers, trainers and young professionals. Dr. Das is an associate fellow of National Academy of Agricultural Sciences, New Delhi and recipient of several National awards such as Lal Bahadur Shastri Outstanding Young Scientist Award, Outstanding Interdisciplinary Team Research Award, Fakhruddin Ali Ahmed Award, National Ground Water Augmentation Award, PS Deshmukh Young Agronomist Award, Young soil Conservationist Award etc. He is also Secretary, Indian Association of Hill Farming, Umiam, Meghalaya, India. Presently Dr. Das is doing research on conservation agriculture, seed production, organic farming and farming system research for sustaining agriculture under changing climate in eastern Himalayas, India.





## New C-MASC Brochure

### Mission of C-MASC

To advance the science and practice of C sequestration in natural and managed ecosystems, assess ecosystem services related to C pool, promote C farming through outreach and linkages with policy makers, provide training opportunities and promote restoration of soil health.

### Scope

- Science of C cycling in soil, vegetation, wetlands and biofuel plantations;
- Effects of C sequestration, acceptability of different options and the human dimensions including education, communication and policy issues;
- Ecosystem services affected by C in soils and biomass;
- International networking on soil C and soil health

### Multi-disciplinary Components

Soil science, climatology, environmental sciences, crop sciences, engineering, geology, economics, geography, human nutrition, computer modeling, social sciences, public policy, and communication.

### Partners

The Center is housed under The Ohio Agricultural Research and Development Center (OARDC) of The Ohio State University (OSU), but collaborates with several regional and national institutions.

The Center is developing the criteria and rationale for C management and sequestration at regional, national and international levels, and is cooperating with international institutions and policy makers towards the development and implementation of a sustainable science-based C policy

### Stakeholders

- State**  
AEP, Ohio Coal Development Office, ODNR, ODA, NRCS, EPA
- Industry**  
AEP, Shell, BP, Monsanto, Scotts Co., Honda, John Deere
- Federal Government**  
USDA, DOD, EPA
- National Laboratories**  
Los Alamos Natl. Lab. (LANL), Pacific Northwest Natl. Lab. (PNNL), Oak Ridge Natl. Lab., Argonne Natl. Lab., Brookhaven Natl. Lab.
- International Organizations**  
**Brazil:** Univ. of Sao Paulo, Piracicaba; Univ. Mato Grosso, Sinop, Cuiaba; Univ. of Ponta Grossa, PR; Univ. Federal de Lavras; EMBRAPA-Sinop  
**South Asia:** Pau, Ludhiana; HAU, Hisar; BHU, Varanasi; IARI, New Delhi; Assam Univ., Silhar; ICAR-NEH, Meghalaya; Indian Inst. Soil Sci., Bhopal; MSSRF-Chennai; UAF, Faisalabad; BZU, Multan; PMAS-Arid Agric. Uni., Rawalpindi; Kathmandu Univ., Nepal.  
**Sub-Saharan Africa:** Sokoine Univ. of Agric., Morogoro, Tanzania; Makerere Univ., Uganda; Mekelle Univ., Addis Ababa Univ., Ethiopia  
**Northeast Asia:** China Agric. Univ., Beijing; Inst. Soil & Water Conserv.; Northwest A&F Univ., Yangling, Shaanxi; Shandong Agric. Univ.; Metropolitan Univ. Tokyo, Japan; Kangwon Natl. Univ., Chuncho, Korea  
**Europe:** ISRIC, Wageningen, Holland; Univ. Reading, U.K.; Imperial College, U.K.; Tech. Univ. Dresden; Univ. Bonn; Christian Albrechts Univ. of Kiel; UNU-FLORES, Dresden; Norwegian Univ. of Life Sciences, Aas, Norway; Alecu Ruso Univ., Moldova; Univ. of Iceland, Reykjavik; INRA- Paris, France; European Commission, Brussels, Belgium.  
**CGIAR:** IITA, Nigeria; ICARDA, Morocco; ICRISAT, India; CIMMYT, Mexico; CIAT, Colombia.  
**Professional Organizations:** IJSS, Vienna; GSW, Potsdam; GSP/ITPS, Rome (FAO); IAEA, Vienna.
- OSU Programs**  
Discovery Themes: ESGP: Energy and the Environ. Program; SENR: IPA (FAES); Gateway Program (OIA)
- Farmer Organizations**  
Farm Bureau, Commodity groups, U.S. Grains Council

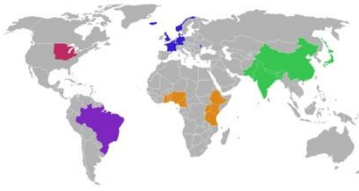
### Contact Information



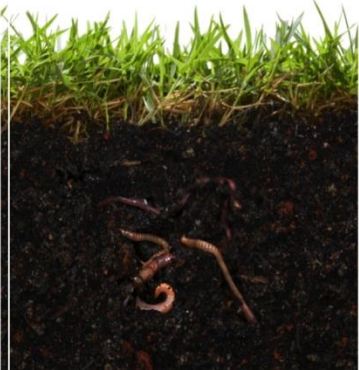
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### International Network



### Soil Health and Carbon Dynamics



### Research Objectives

- The multi-disciplinary center is focused on C sequestration in soil, vegetation and wetlands, and in biofuel offsets. It is:
- Developing a national and international database on current and potential rates of terrestrial C sequestration for diverse land uses and soil/vegetation/wetland management options;
  - Determining C sink capacity for major soils, vegetational zones and ecoregions;
  - Establishing relationship between soil C and soil health/quality in relation to total biomass and economic productivity;
  - Standardizing new and innovative methods of C determination in vegetation and soil;
  - Assessing comparative economics of C sequestration through different processes;
  - Assessing feasibility of biofuels as fossil fuel offsets and assess its energy ratio;
  - Providing training opportunities for scientists and land managers; and
  - Supporting C farming by assessing the rate of sequestration, and the societal value of C.
  - Assessing ecosystem services influenced by C dynamics

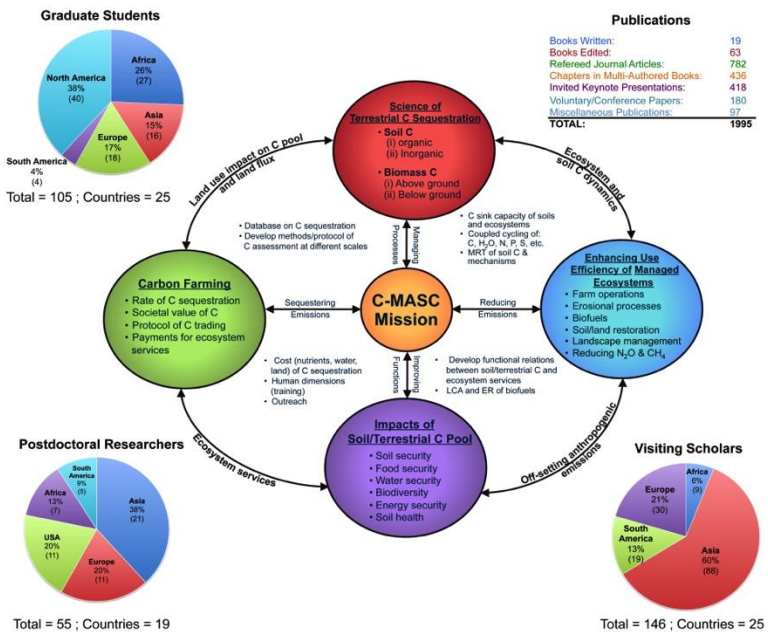
### Need

There is a growing concern about the increase in atmospheric concentration of carbon dioxide (CO<sub>2</sub>) and other greenhouse gases with attendant effects on observed and projected climate change. The Carbon Management and Sequestration Center (C-MASC) is identifying ways to minimize carbon (C) loss and maximize retaining C in land, reducing the effects of CO<sub>2</sub> on global climate change that will radically change plant, animal and human life if left unaddressed.

### Rational

Improve and sustain soil health and its functions through increasing the soil C pool to meet the demands of growing and progressively affluent world population through climate-resilient (climate-smart) agriculture.

Inter-disciplinary mission of C-MASC is the recarbonization of the terrestrial biosphere and the enhancement of its ecosystem services and functions:



### Research Goals

1. Advance science of soil C sequestration in natural and managed ecosystems.
2. Provide technical support to industry, land managers and policy makers towards natural sequestration of C in land and water ecosystems by creating the database on rate of sequestration and sink capacity (capacity of the land to store C) of C for recommended land use and management practices.
3. Facilitate commodification of C in assessing its societal value for benefits to agronomic/forestry productivity, impacts on water quality and reduction of the greenhouse effects, and provide information useful for public and private strategic analysis for C sequestration and climate change management.
4. Develop a cadre of world-class scientists trained in the cutting edge of science and technology.



### Recent C-MASC Publications

#### Journal Articles

- Chambers, A. R. Lal, K. Paustian. 2016. Soil carbon sequestration potential of US croplands and grasslands: Implementing the 4 per Thousand Initiative. [Journal of Soil and Water Conservation 71\(3\):68A-76A.](#)
- Das, Anup, Rattan Lal, Upender Somireddy, Sudhir Verma, Basant Kumar Rimal, and Catherine Bonin. 2016. Changes in soil carbon storage under biofuel crops in central Ohio. *Soil Research* [doi.org/10.1071/SR14353](https://doi.org/10.1071/SR14353)
- Li, H., J. He, Z.P. Bharucha, R. Lal, and J. Pretty. 2016. Improving China's food and environmental security with conservation agriculture. *International Journal of Agricultural Sustainability* [doi: 10.1080/14735903.2016.1170330](https://doi.org/10.1080/14735903.2016.1170330)
- Munoz, M.A., J.G. Gusman, R. Zornoza, F. Moreno, A. Faz, R. Lal. 2016. Effects of biochar and marble mud on mine waste properties to reclaim tailing ponds. [Land Degradation & Development 27:1227-1235.](#)
- Olson, K.R., M. Al-Kaisi, R. Lal, L. Cihacek. 2016. Impact of soil erosion on soil organic carbon stocks. [Journal of Soil and Water Conservation 7\(3\):61A-67A.](#)
- Zhao, X, S. Liu, C. Pu, X. Zhang, J. Xue, R. Zhang, Y. Wang, R. Lal, H. Zhang, F. Chen. 2016. Methane and nitrous oxide emissions under no-till farming in China: a meta-analysis. [Global Change Biology 22:1372-1384](#)

#### Presentations

- Lal, R. 2016. Soil Health and Environmental Management for Sustainable Agricultural Production Systems. International Conference on Pulses for Health, Nutrition and Sustainable Agriculture in Drylands. Marrakesh, Morocco 18-20 April 2016.
- Lal, R. 2016. Soil C for Climate Change, Food Security and SDGs of the U.N. FACCE-JPI Meeting, Brussels, Belgium 30-31 May 2016.
- Lal, R. 2016. Environment and Agriculture. Federal University of Mato Grosso (UFMT), Cuiaba, Brazil 9-13 May 2016
- Lal, R. 2016. Evolution of Conservation Agriculture. Federal University of Mato Grosso (UFMT), Cuiaba, Brazil 9-13 May 2016
- Lal, R. 2016. The Ohio State University. Federal University of Mato Grosso (UFMT), Cuiaba, Brazil 9-13 May 2016
- Lal, R. 2016. [Soils and World Food Security](#). GIFS Conference, Saskatoon, Canada, 14-16 June
- Lal, R. 2016. [Soil Health and Sustainability](#). GIFS Conference, Saskatoon, Canada, 14-16 June

#### Forthcoming Books from C-MASC

- Lal, R (Ed). 2016. Encyclopedia of Soil Science, Third Edition. Taylor and Francis, Boca Raton, FL.
- Lal, R. and B.A. Stewart (Ed). 2016. Soil Phosphorus. Advances in Soil Science. Taylor and Francis, Boca Raton, FL.
- Lal, R., D. Kryabill, D.O. Hansen, B.R. Singh, T. Mosogoya, L.O. Eik and (Eds). 2016. Climate Change And Multi-dimensional Sustainability in African Agriculture. Springer, Dordrecht.

#### Conferences Pertinent to Soil and Climate

- 2016 IUSS Inter-Congress Meeting, 20-25 November 2016, Rio, Brazil.
- Third WASWC Conference, 22-26 August, Belgrade University, Serbia.
- ASA/CSSA/SSSA Annual Meeting, 6-9 November 2016, Phoenix, Arizona, USA "Resilience Emerging from Scarcity and Abundance".
- Geosciences, 6-7 October 2016, Orlando, Florida, USA. Theme "Geosciences and Policies: Economy and Culture in a Changing World".
- Soil and Water Conservation Society, 24-27 July 2016, Louisville, Kentucky, USA. "Managing Great River Landscapes".
- Fourth International Agronomy Congress, 22-26 November 2016, New Delhi, India. "Agronomy for Sustainable Management of Natural Resource, Environment, Energy and Livelihood Security to Achieve Zero Hunger Challenge".
- COP 22, Climate Summit, 7-18 November 2016, Marrakech, Morocco
- AGU, Fall Meeting, 12-16 December 2016, San Francisco, CA
- EUROSOIL, 17-22 July 2016, Istanbul, Turkey.

**Do you have contributions for our next newsletter?  
Please contact us!**

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