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Webinar IV
Sustainable Soil and Land Management
for Climate Smart Agriculture: Preventing
and Mitigating Land Degradation

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Sustainable Soil and Land Management for Climate Smart Agriculture: Preventing and Mitigating Land Degradation

24 June 2020

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Questions and Answers

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1) I would like to know how climate change will impact on the groundwater

Climate change models predict that large parts of the world would become drier and hotter. This will be accompanied by increased water withdrawals from groundwater for irrigation, therefore the impacts would be severe in many regions, like the Mediterranean, with depletion of groundwater.

2) Doesn't soil have a role in poverty alleviation besides, zero hunger, climate change and life on land?

Soil fertility directly related to farmers subsistence.

3) What are the types of new degradation patterns and what is the difference between current and new degradation patterns?

New degradation patterns are for example those associated with sea rise: floods and coastal erosion. Otherwise its rather an aggravation of known degradations. Climate change is also bringing new degradation patters, such the above-mentioned sea-level rise and extreme events with devastating consequences.

4) The graph showed that after certain level of SOM, the yield is stable? May I know the peak level of SOM where the yield is maximum? Or isn't the yield increase with the increase in level of SOM

It is hard to say what is the peak level of SOM as this depends on many characteristics such climate, geo-morphology, latitude, land use, elevation and much more. Data from a farm in Portugal show that under no till corn farming associated with legume cover crops SOM increased from 0.5 to 3% in 20 years in alluvial floodplain while corn yield remained stable at about 12 ton/ha under sprinkler irrigation.

5) Conventional cotton farming harms the environment. The remedy for this is organic cotton production. What measures can be taken to increase this production?

Increased consumers' awareness (soil quality), specific incentives (some exist in EU, but not enough). For cotton I agree that you do not have the rationale of food quality and health or less.

As mentioned during the webinar, using the Regenerative Agriculture practices (that are based on similar principles like Climate Smart Agriculture) a few pioneers of the fashion industry are producing cotton in India using the practices of Agro-ecology (i.e. no till, crop rotation, cover crops. Please read this:

<https://www.vogue.com/article/regenerative-agriculture-sustainable-fashion-christy-dawn-fibershed>

6) Under tropical climate and scarcity of water, do you think that tillage practices can be good solutions for soil conservation?

Tropical climate is not characterised by water shortages, nevertheless all conservation tillage practices could be implemented as well. What may be limiting is the availability of crop residues to make a mulch.



7) How Sustainable Agriculture can address the environmental and human food security and health harm of industrial agriculture?

Sustainable agriculture is based on five principles 1. Productivity, 2. Stability (i.e. land tenure, inputs, etc) 3. Protection of natural resources, 4. Viability (farm income), 5. Acceptability (from farmers to change). These are universal principles that if correctly applied will address all the issues of concern.

8) To what extent does the monoculture of agrobusiness, and the use of commercial fertilizers and pesticides impact soil erosion?

There is an indirect effect rather than a direct one: decreasing soil biodiversity, cancelling organic fertilisation (and hence affecting soil organic C content of soils and sensitivity to erosion)

9) Would you please elucidate some inputs that increase SOM significantly?

Crop residues and among these roots are more efficient than above ground residues also: manure, composts, digestates, biochar...

The effect on SOC stocks depend on the quality of these inputs

10) Do we need to compromise with crop productivity by adopting Conservation Agriculture?

It is not always compromised, but I agree that farmers take a risk especially during a transition period. This could be also the reason why conservation agriculture covers roughly 12% of the global farming.

11) Do you think a biotechnology solution could be an option for re-carbonization of soil Engineering crop to produce suberin to stock carbon in roots

So far research results show that there is no recalcitrant molecules that persist for decades and centuries, except char. However, I do agree that roots are essential to soil.

12) How to improve C:N ratio in soil? Is it also sustainable soil management practice?

Use legumes for example ? Is it feasible in your context ?

13) Can we generalize that sustainable soil and land management is necessarily climate smart? How can we define their relation?

I am not sure you can generalise: for example combating contamination or combatting salinization may not have effects on climate change mitigation and adaptation. But many sustainable soil management options are also climate smart. Climate Smart Agriculture is based on 3 principles 1. Productivity, 2. Adaptation to CC, 3. Reduce GHG emissions. If through SLM you are implementing you are able to fulfil all the 3 principles, then you are meeting the target.



14) No tillage agriculture is significantly important for soil conservation and save energy and labor. However, it has not been widely used all over the world ? Reasons and what could it be done for it ?

It is very widely used in North and Latin America (Brazil, Argentina..), not in other continents. Risks? pests, soil compaction. There is a transition period where yields can decrease. there is a period of learning. Risks !

Also it is not the tradition not to plow and to have «dirty» crops. The issue was addressed at point 11.

15) I want to ask if monoculture can be considered as erosion for soil

In many situations, monoculture is associated with having bare soil for periods and then exposed to erosion and often (but not always) associated with systems where crop residues are exported. Overall monoculture could accelerate erosion, that's why crop rotations and cover crops assure year around soil cover reducing erosion risk.

16) Since soil is so much contributing or mitigating GHG issues why there is not a system similar as it is developed for forest (UNREDD+) with payment to farmers who contribute to soil conservation with payment for ecosystem service (PES). This will be a normal way to retribute individual, and not only government when we do not always where money goes, for their global contribution?

Payment schemes like this are available in certain countries, for instance in the USA farmers are paid through the Conservation Reserve Program (CRP) and million of acres are left aside when the erosion or other soil degradation processes are threatening soil quality. In the EU the new Common Agriculture Policy (CAP) award 30% of payments for resource base conservation, including soils, as well as for green corridors, protection of biodiversity, etc. The issue is that payment programs in the developing countries are much less implemented, except in occasional cases through the PES schemes.

17) How do small farmers of Africa can improve yield and preventing soil from erosion and degradation in small farms because farmers have small acreages

Despite small size of farms, in many areas throughout Africa such as in Ethiopia, Kenya, Burkina Faso small farmers are implementing soil conservation practices. The issue is to disseminate them to other farmers, that might ne reluctant due to concerns that yields may be lower, but in the medium and long term, these practices pay off.

18) The fertilizer industry is developing more crop specific fertilizers. Are these better in soil management compared to generic DAP and CAN traditionally used by smallholder farmers

All newly developed fertilisers are tested by the fertiliser industry before they are commercialised including crop specifications based on their nutrition needs. However, chemical fertilisers should be used in combination with organic manure and all other forms of naturally derived nutrients. Small farmers are more inclined to use these forms of organic nutrient sources.



19) In agroforestry and green mulching, how important are the tree/herb varieties in soil management? Putting in consideration secondary economic benefits such fruits from the trees and trees that harbour beneficial endophytic microorganism.

Very important in terms of farmers income I agree! Planting trees mean that you reduce the surface area of your crop, hence it is a loss of revenue. However, selecting a tree that brings you income can make a difference and in addition in many situations' yields are higher per surface area in agroforestry/conventional crops (shading effect for example)

20) Kindly highlight on "how we can provide Sustainable Land Management Services to the small farmers of developing country like as Bangladesh"?

Bangladesh is not an exception from all other countries. The first thing you could do is to select the appropriate SLM practices that are suitable for the crops and farming systems you largely use in your country. Then in specific pilot areas you could organise farmer schools and visits in these areas and allow farmers to talk to each other and share experiences. These programs work when they are based on a bottom up approach. Then the role of the extension service based on scientific based evidence is crucial to disseminate SLM.

21) Can the reclaimed land become agricultural land, where previously the reclaimed land was taken from agricultural land?

The question is not clear, nevertheless, there are millions of hectares that have been reclaimed from wetlands, rocky areas and converted to agriculture land. The long term sustainability for agriculture of these lands depends on investment like drainage, or irrigation systems. On the other side, there are millions of hectares of agriculture land that have been converted for urban use, infrastructure development and other similar forms. This process called also soil sealing and land take is most typical in the EU as well as in many other countries around the world.

22) Do you think these experiences can be effective even when practiced on a small scale?

Yes, also at small scale SLM practices have proven to be successful. Please visit the WOCAT database.

23) Are there "easy" monitoring and evaluations of soil that novice (young) farmers can do that can also contribute and be mainstreamed to the academia or policy making processes that we can already encourage our farmers to try?

There are methods to examine soil structure, developed e.g. in US, Switzerland Brazil: accessible to anyone with a shovel. Visual assessment of soil structure gives you a good insight on soil structure, organic matter and biological activity. There is also the slaking test if you are concerned with poor soil structure, and there are the tests to quantify earthworms.

24) What are you talking about when you say input and incomes that are needed to be improved?



We are talking about that each farmer needs to secure enough income to feed his family in the first place then the rest of us. To reach at this stage the farming system (i.e. farmers) need also inputs such as fertiliser, irrigation and many other inputs, including qualified knowledge and advice.

25) Are these sustainable soil management techniques also suitable and be made self sufficient for commercial farming entities?

SLM could be implemented for all forms of farming systems no matter the size of the farm.

26) Is DeSIRA going to continue into 2021?

Yes

27) What is the significant effect of construction of physical soil water conservation like terrace on SOC in mountain areas?

Terraces are proven for thousands of years (Machu Pichu, Cinque Terre, China, and throughout Asia) to protect mountain or better sloping lands from erosion. If soil is not eroded chances are that also SOM would not be lost.

28) Endorsing a multi-stakeholder approach in CSA without engaging from the first stage of programme or project conception the beneficiaries means the producers (agriculturers, pastoralists, foresters, fishers...) may not result in a good ownership and sustaining the CSA

CSA as many other forms of sustainable farming to be successful need to have the endorsement of all stakeholders. If they are not convinced of their success, they will not implement them. As previously mentioned, they need the implementation of the bottom up approach.

29) For countries with low land resources such as my country, Sri Lanka the challenges will be multiple than land rich countries in front of Climate change impacts further aggressing with population growth. What is your view on countries of this nature in soil preservation and sustainable food supply

You have to use in the most sustainable way the limited resources you have. All the principles of sustainable agriculture should apply. In term of soil management, please keep erosion under control, implement whenever possible crop rotations, no till or minimum tillage, agro-forestry, keep the soil covered using cover crops, and construct terraces on sloping lands.

30) Comment trouver un compromis entre zero labour, conservation des sols et production, surtout avec l'augmentation de la population mondiale

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31) How to manage the gully erosion?

The best way to manage gully erosion is to built the so-called check dams at frequency of 4-5 meters from each other depending on the length and how deep the gullies are.

32) I would like to ask about the list of funding initiatives you have mentioned, Do you think organic farming would play its role on the as a combine soil and land management systems? or if any positive effect examples, worldwide. Thank you very much.

There several funding opportunities as I mentioned in my talk. But to have access to them, countries should develop their strategic plans in support of SLM and then in close collaboration with finding agencies specific projects should be drafted and submitted for approval. The implementation process is the most difficult one that should be made in close collaboration of all stakeholders and farmers should the main actors of the whole process. Organic farming plays a very important role both in terms of nutritious food and for the good impacts it has in soil health.

33) Is application of biochar consider as part of Sustainable Smart agricultural? What is its contribution towards SSA? Please reflection on the opportunities and challenges?

There is a lot of research on going on the impacts of biochar regarding soil quality and as a remedy to climate change by storing in the soil large amounts of carbon. This was proven by the indigenous people in tropical forest of Brazil by the creation of the so-called Terra Preta. So, whenever there are the facilities to produce biochar this product should be used.

34) These days liquid nanoclay is very popular for management of degraded land/desertification. Is this climate smart? Do you suggest nanoclay practices for regeneration of trees in degraded land?

Nanoclays do retain water and carbon, but how much nanoclays do you need to apply to have a detectable effect? And what is the cost of nanoclays? I am afraid it is likely to be much more expensive compared to using photosynthesis to increase organic inputs to soil and hence organic matter content.

35) Land degradation is a very common problem in the east African region, often being the main driver of low yields hence continued chronic hunger...what is the best SLM you could recommend for this part of the world?

Agro-forestry has given very good results in Ethiopia and Kenya to mention a few countries. Terracing is also successful in Ethiopia or the Fanya-juu terraces in Kenya. So there is not a single bullet, instead there are a set of practices that need to be implemented depending on the local context and the problems encountered.

36) Agroforestry can be applied only as an organic system? or conventional

Yes both, absolutely! Depends on how you manage your crop...



37) Is it possible to implement agroforestry (date palms forest) in UAE or better to use integrated farming system for sustainable and smart agriculture?

In the arid conditions of UAE agroforestry may need to be carefully evaluated due to lack of water and the competing for it from various crops. Since you are using only groundwater for irrigation, there is the risk that salinity built may accelerate. So be careful if you decide to include other crops in date palm plantations.

38) Will the innovation practices nowadays in Agriculture to produce more with limited use of resources specially water have a positive impact on soil?

Technological innovation has always produced good results, the issue is not to overuse chemical inputs that may lead to soil contamination. Water also need to be used very efficiently through appropriate irrigation systems, preferably pressured systems to increase water use efficiency.

39) As you know, worldwide there is more than 800 million inhabitant suffering from hunger while we are looking for solutions to that we had land degradation due in so many time to inadequate land management from the other side and we have to reconcile between these two facts... is it time probably to rethink our agriculture and come back to more resilient varieties and local knowledge to cope more with climate and recuperate ancient consumption behaviour?

Traditional knowledge should hand by hand with technological innovations and most importantly local crop varieties should be encouraged to be used. There is an important initiative from the FAO called Globally Important Agricultural Heritage System <http://www.fao.org/3/i9187en/I9187EN.pdf>

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