

When little becomes much!

Jimma and Cornell Universities join hands in developing climate smart Programs in Ethiopia using US Embassy's seed grant



Figure 1: Degraded and restored landscapes

Global climate change is well underway and policies must be enacted to reduce anthropogenic GHG emissions through socio-economical and environmentally sustainable mechanisms.

Do the above two landscapes significantly differ in terms of mineral composition, soil fertility, and moisture content? You may say "Yes". However, answering this question for the agricultural scientist is not as simple for it needs rigorous scientific investigation. But, "why is it important to carry out scientific investigation since they are apparently different?" you may ask. The reason is that the outcome from such investigation enables policy makers to reach appropriate decision in addressing global warming or environmental problems.

Though there are debates about global warming, it is undeniable that Mother Nature is turning violent. This is terrifying for people on the planet and endangers plants and animals. A quarter of the world's land

animals and plants could be extinct in the next 50 years, and for this human activity and climate change are responsible, according to a study in Nature.

It is now clear that the Earth's climate is warming, and that it is doing so in response to changes to the atmosphere resulting from human activities. A target rise in global average surface temperature of no more than 2° C has been widely advocated as required to maintain the Earth system within safe limits. However, at current global emission rates, the world will have exceeded its total budget to keep warming below 2° C within 25 years.

As part of the globe, Ethiopia is also suffering from serious environmental problems such as deforestation, land degradation, and accelerated soil erosion. The problem is attributable to factors such as clearing of woodland for agriculture, cereal production, and use of dung and crop residues as fertilizers, according to the study of Berry (2003), which was commissioned by Global Mechanism with the support from the World Bank.

Land degradation is the reduction in the capacity of the land to provide ecosystem goods and services and assure its functions over a period of time for its beneficiaries.



Figure 2: Examples of extremely degraded and highly overgrazed landscapes in Ethiopia

As we human beings are all jointly responsible for the problem, we are also responsible for safeguarding the habitat and taking energy saving methods. Earth Times (10 May 2011) suggests: “The world is already warming and we can slow the process down by reducing the amounts of greenhouse gas currently being released into the atmosphere and concentrating more on energy saving measures and renewable energy systems.”

Accordingly, to alleviate the problem or to slow the process, that is to say, to protect environment and natural resources, in line with the agricultural policy of Ethiopia, various interventions have been made and as a result several degraded landscapes have been restored.

Meeting targets to limit warming within this safety margin will require a concerted and protracted global effort, and will require developing countries to adopt policies like Ethiopia’s ambitious and forward-looking Climate-Resilient Green Economy (CRGE)

strategy. Sequestering carbon in soils and trees is likely to be an essential element of any mitigation scenario that achieves safe climate stabilization, making land restoration works a key part of an overall climate-change mitigation strategy.

Along with the looming challenge of global climate change, Ethiopia must also address poverty and malnutrition endemic to the developing world.

The main objective of this Climate Smart Program in Ethiopia is, by repeatedly taking samples at different time intervals from different sites in Ethiopia, to measure whether the interventions had relevant impact on the landscapes in terms of mineral composition, soil fertility, and moisture content and to report the result to policy makers.



Figure 3: Jimma University research team

Such investigation needs senior and technical experts from diverse disciplines (such as agronomy, environmental sciences, engineering, economics etc.) and large amounts of funds. Hence, in response to the situation, Jimma and Cornell University, together with other partners, established collaborative partnership using seed grant secured from the US Embassy, and took the initiative in 2011 to initiate a joint climate smart research and development projects.



Figure 4: Cornell University research team

According to Dr. Berhanu Belay, principal researcher from Jimma University and director of the projects in Ethiopia, several climate-smart agriculture projects have been initiated since 2011, in two phases: Phase I (2011-2013) and Phase II (2014). This section of the report presents these activities in that order.

Phase I: The Beginning

Phase I began in 2011 with modest seed grant of \$15,000 from the US Embassy in Ethiopia, to foster innovative partnerships between US and Ethiopian universities. This report presents the expansion of the joint partnership.

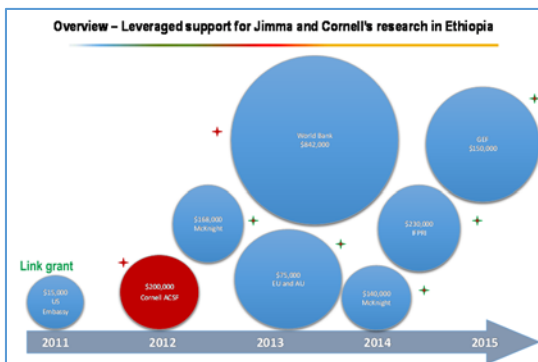


Figure 5: When little resource becomes much!

The climate-smart program activities involved: (i) developing a concept note for a project on clean-burning cook stoves and climate-smart agriculture in Ethiopia (2011), (ii) diversifying the climate-smart program (2012), and (iii) leveraging the UNIDO-funded BiocharPlus project, organizing training

workshops and developing the Climate Smart Initiative (CSI) (2013).

(i) Developing concept note (2011)

At the start of Phase I, in 2011, the two community based universities jointly developed a concept note for a project on clean-burning cook stoves and climate-smart agriculture in Ethiopia with the following two objectives: (1) improving household air quality, children as well as women’s health and well-being; and (2) exploring future joint environmental sustainability research-for-development opportunities.

(ii) Beginning of the diversified climate smart program (2012)

In 2012, the number of grants and stakeholders started increasing. A total of \$368,000 was granted for diversifying the climate-smart program. While The Atkinson Center for a Sustainable Future granted \$200,000 for projects that generate indigenous fertilizers from wastes, the McKnight Foundation provided \$168,000 for sustainable biochar systems.

In the same year, Cornell University and Jimma University diversified the climate-smart program. This diversification can be seen from two perspectives. For one thing, they developed projects that integrate renewable energy and clean-burning stoves with climate-smart sustainable agriculture and mitigation of climate change. This includes developing alternative indigenous fertilizers development using value chains of locally available low-value agricultural and agro- industrial waste-streams for resource-poor rural households in Ethiopia.

The other aspect of diversifying the climate smart program is sustainable biochar systems aimed to improve soil fertility and crop yield in Ethiopia. This entails (1) enhancing soil fertility, crop yield and soil carbon sequestration, (2) reducing deforestation and loss of biodiversity, and (3) mitigating climate change.

(iii) Leveraging BiocharPlus project and organizing training workshops for

*smallholder farmers and young and for Ethiopia's upcoming universities (2013)**a) Leveraging BiocharPlus project*

In 2013, the amount of grant funding and the number of stakeholders kept on increasing. For leveraging BiochairPlus, European and African Union ACP-EU Cooperation Program in Science and Technology granted \$1,500,000, where Jimma and Cornell's portion of the grant is \$70,000.

In addition to searching for grant funding, Cornell and Jimma University, in partnership with the University of Udine in Italy, leveraged BiocharPlus to develop methods of effectively and organically rebuilding the soil in a vegetable gardens and achieved amazing results! As research and field trials in different study sites have shown, the project (1) fostered effective waste recycling, (2) captured and stored carbon for mitigating climate change, (3) enhanced soil fertility, (4) reduced or reversed land degradation, and (5) improved crop yield!

The other interesting outcome of leveraging BiochairPlus is its contribution to capacity building. That is to say, it enhanced the capacity of small-scale farmers in Ethiopia and Ethiopian students and professionals, especially women at community-based Jimma University, to improve on agricultural and environmental sustainability and food security. On top of that, the program was found beneficial for capacity building and appropriate technology-based market and entrepreneur opportunities management.

b) Organizing train-the-trainer workshops to support young and upcoming Ethiopian universities

The other activity accomplished in 2013 is related to organizing a train-the-trainer workshop. Accordingly, Jimma and Cornell University organized a hands-on train-the-trainer workshop for teaching and research staff as well as librarians of five South West universities: Jimma, Metu, Assosa, MizanTepi and Wolkite.

The training focused on two areas: (i) developing skills to effectively use The Essential Electronic Agricultural Library (TEEAL) and Access to Global Online Research in Agriculture (AGORA) and (ii) introducing skills to promote these resources at each participating university and to teach faculty, staff, researchers, and students at participating universities so that they can effectively use both TEEAL and AGORA.

These two resources are available at low or no cost to eligible institutions in low-income countries. Put it the other way, for the first time in history, researchers in eligible countries such as Ethiopia's young and upcoming universities, which are clustered in the southwestern parts of the country, can have (1) access to the same kind of information as their peers in more economically-developed countries and (2) to participate in the global research agenda.

The training course comprised lectures delivered in a classroom setting, hands-on exercises, and group work, which were facilitated by Cornell University's Mann Library and ITOCA experts. While some of the exercises involved accessing relevant live websites and portals on the internet, others were conducted offline. Each participant had access to a computer during the practical exercises courtesy of Jimma University.

(iv) Developing climate-smart initiative (CSI) collaborative project

For developing the CSI project, a significant amount of grant funding was secured. The World Bank funded the project (which is administered by CARE-Ethiopia) in the amount of \$842,000, Cornell and Jimma Universities received \$77,000.

Developing projects through the Climate-Smart Initiative (CSI) in food-insecure areas of Ethiopia was the other accomplished activity by Jimma University, Cornell University, and CARE, during the last step of phase I, in 2013.



Figure 6: Jimma and Cornell conducted soil carbon sequestration and soil fertility assessment of PSNP projects across 6 Ethiopian regional states as part of the climate smart initiative consortium working under CARE-Ethiopia consortium

The project was developed to achieve seven objectives. Four of them are: (i) strengthening the two arms (PSNP & HABP) of the food security program in Ethiopia by making them more climate smart, (ii) assessing the various best management activities in light of climate change and low-carbon livelihoods, climate change adaptation and mitigation, (iii) collecting primary data from PSNP sites on soil and biomass carbon and other climate-smart sustainable land management indicators, and (iv) modeling and predicting potentials for carbon sequestration and to allow monitoring verification and reporting of carbon stock changes.

The remaining three objectives of the project include: (5) establishing a framework for securing climate-change mitigation finance to support climate-smart agriculture food security and public safety network projects in food-insecure regions of Ethiopia, (6) recommending a portfolio of measures that are best suited to climate funding opportunities, and (7) engaging in future climate-smart safety net initiatives in food-insecure parts of Ethiopia and informing, monitoring, and verifying climate change financing and adaptation mechanisms, as part of the CSI consortium.

One aspect of developing the Climate-Smart Initiative (CSI) is restoring degraded landscapes. To restore and make them once again productive, the CSI consortium and PSNP projects have been working hard throughout the most food-insecure regions of

Ethiopia. The CSI team was engaged in diverse agro-ecological zones (from arid lowlands to humid tropical mountains), with a diverse set of livelihood types (from pastoral to agrarian), and a diverse set of climate-related risks in 28 regions. As a co-benefit of these food security interventions, carbon stocks and ecosystem services and benefits in the land scope were also increased.

Phase II: Indigenous Fertilizer Development

The joint initiatives continued growing in both the amount of resources and number of stakeholders. Phase II presents activities related to the indigenous fertilizer development for agro-ecological intensification.

In 2014, Cornell and Jimma University - teamed with Ethiopian Government Agricultural Research Institutions - secured in total \$420,000 from Cornell's Atkinson Center for a Sustainable Future (ACSF) and other donors. While IFPRI-ATA granted \$280,000 for Commercialization of Animal Bone-Derived Fertilizers in Ethiopia, the McKnight Foundation granted \$140,000 for indigenous fertilizer development for agro-ecological intensification of sustainable legume-cereal production in Southwestern Ethiopian smallholder farming system.

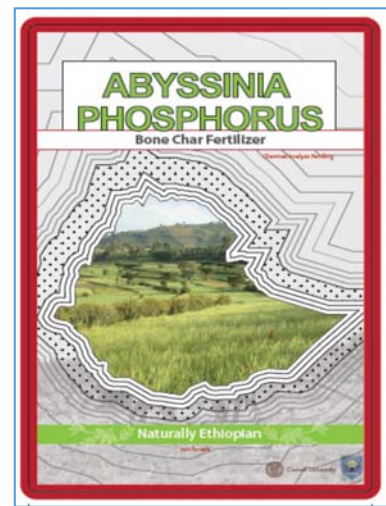


Figure 7: Jimma and Cornell developed the first indigenous fertilizer (Abyssinia Phosphorus) sample

The increase continues: In the same year, 2014, Cornell and Jimma teamed up with The NSW Department of Primary Industries (NSW DPI) - Industry and Investment NSW's Science and Research Division-and secured additional funding in the amount of 2,000,000 from The Global Environmental Facility (GEF) and UNEP for the biochar project. Cornell and Jimma Universities' share is \$150, 000.

During this year, the accomplished activities which are related to the indigenous fertilizer development for agro-ecological intensification project include: (i) identifying biophysical assessments of crop production constraints, (ii) identifying both already existing and new promising sources of plant nutrients both on farms and in smallholder farming communities for indigenous fertilizer development, (iii) developing, characterizing and evaluating crop and agro-ecology specific indigenous fertilizers for cereal and legume intensification systems, and (iv) building local capacity of the partnering institutions for appropriate farmer-need-based technology development, and designing as well as effectively running agro-ecological intensification to combat soil fertility decline and land degradation.

Before summarizing and concluding the report, it is important to indicate the scope of the GEF-funded biochar projects. The projects focus on long-term biochar research sites across the globe which were established to study: (1) the basic science of biochar, (2) the interactions of biochar with various soil types and its impact on agricultural productivity, (3) climate change mitigation in different ecosystems, and (4) evaluate biochar effects in different cropping systems, effective use of biochar including its production and composition.

Summary and Conclusion

In summary, during two phases, from 2011-2014, many activities were accomplished. During Phase I, activities started with a program funded by the US Embassy to foster

innovative partnerships between US and Ethiopian Universities that led to the development of concept notes (both in 2011), continued with a climate-smart program (in 2012), and initiating BiocharPlus, organizing training workshop, and developing the World-Bank funded Climate Smart Initiative (CSI) in 2013. During phase II (starting in 2014), indigenous fertilizers for agro-ecological intensification were developed.

In conclusion, when the joint Jimma-Cornell Climate Smart Program started in Ethiopia, the grant funding of \$15,000 awarded by the US Embassy in Ethiopia, was very modest. As time goes on, with amazing speed, however, that picture has changed. The number of grants increased as partners started to join the program. The ever-growing program has attracted many stakeholders that mushroomed into a larger consortium.

It astounds us that so far in advance, Jimma University worked for this great increase in the number of partners which would in turn lead to a great increase in grant funding. Moreover, Jimma University is satisfied that it made numerous contributions with its team of (Ethiopian and non-Ethiopian) horticultural professionals and other senior and technical experts to the effectiveness of the joint Climate-Smart Program in Ethiopia! How encouraging it is to remember that all these dedicated partners will see these programs through in collaboration with Jimma University.

What a thrill it is to see the success of the project in the activities it has accomplished so far and to have a part in it! Yes, it is a joy to realize that this increase brings recognition to the partners who worked towards this success. When Jimma University determined to start the project with little funding (\$15,000), this little grant support multiplied and became a heap-it has prepared the stakeholders to accomplish astonishing activities that lead to the main study- investigating the mineral composition, soil fertility, and moisture content of a

diverse set of climate-smart agriculture interventions.

And just think of what got started in 2011. The US Embassy seeded a grain then to see the consortium harvest a heap now! Yes, it is possible to start with little and to accomplish a lot! But remember, this is no time for the consortium to slow down in finishing what they have started - the project hits its target when it sprints to the finishing line.