

“Factoring Young Voices to address Critical Challenges”

YPARD representative’s perspective on SCIENCE FORUM 2011
‘The Agriculture–Environment Nexus’



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The Science Forum with focus on the ‘Agriculture-Environment nexus’ provided a good overview on the spread of activities, involvement and focus of Consultative Group on International Agriculture Research (CGIAR) and its umbrella organisation to addressing this interface. Point of view of experts outside CGIAR such as Asian Foresight Institute, Universities and think tanks was complimentary to understand the role, spread, significance of agriculture-environment nexus in conjunction with a bigger sustainable development domain. The diversity of discussions on current trends of food security, agro biodiversity, climate challenges, advocacy and capacity strengthening to mobilise dissemination of scientific outputs and emphasis on impact assessment covered a wide facet of issues that require priority attention and innovative approaches. Additionally, the discussions stimulated an array of views as listed below

- Energy is a cross-cutting issue for managing the challenges of agriculture production and environmental stability
- Innovation as an approach to engage of youth in Agriculture ventures is a fresh call.
- Pathways to strengthen resilience both agro-ecological and socio-economic.
- Preparedness for early response to emerging challenges such as climate change is pre-requisite for risk reduction
- Emphasis on clear frameworks for impact assessment, monitoring and evaluation, science mobilisation and food security.
- Clarity on emerging strategies and trends of bio-based economy (e.g. optimise not maximise resource use; credit market for carbon sequestration and productive water use mainstreamed with development initiatives in agriculture and environment)
- Exploring newer domain viz., agribusiness opportunities, co investment models and public private partnership framework for improved synergy in agriculture–environment objectives

To elaborate on the sector specific observations, YPARDS reps from different sessions have made a conscious effort to synthesize key points from the sessions.

Brief note on different sessions

Session 1: Resource Scarcity and the Ecological Intensification of Agriculture

Key observations

In many parts of the world, agricultural intensification has been accompanied by the misuse and overuse of pesticides and fertilizers, the development of pesticide resistance, and environmental pollution with agricultural chemicals. Part of the reason for these problems is that current scientific thinking on agricultural intensification very much focuses on improved seeds, plant nutrients and water with little regard for natural ecosystems and the services these ecosystems provide. This session addressed the question if re-introducing ecology into agricultural thinking could be a pathway to sustainable intensification.

Identified gaps

The discussion very much focused on whether or not *ecological intensification* is actually a new concept (“Old wine in new bottles?”). The majority of the speakers and most of the audience thought it was not. This was perhaps not surprising as eight of the nine speakers did not make a clear link to

ecology in their presentations but rather focused on improving the efficiency of inputs, chiefly fertilizers and water. Several presenters used concepts such as eco-fertilization, eco-irrigation and eco-efficiency, which had little to do with ecology but more with saving inputs and thus with economy. Dr. Geoff Gurr from Charles Sturt University did elaborate on the use of ecological knowledge in agriculture—mostly building on examples from integrated pest management.

In spite of this shortcoming, ecological intensification is a useful and a novel concept. One could define it as “*exploiting the positive interactions (synergies) between living organisms in agro-ecosystems to increase agricultural productivity*”. The concept is useful and novel because in crop ecology and agricultural economics we have too much focused on crops and the inputs these crops need (sunlight, nutrients, water, and management) but never really considered the other living organisms in agro-ecosystems and how these can contribute to improved productivity. Intensifying agriculture is crucial and yet, we don’t have to do away with modern inputs (such as in organic or ecological agriculture); however the efficiency of these modern inputs could be improved if we take better care to create healthy ecosystems in which we grow crops.

Role of youth

The presenters showcased that it is difficult to think out of the box in which we have been trained as most interpreted ecological intensification as producing more with less inputs. It will require a new generation of scientists to take up the concept and test how ecological knowledge—which is knowledge about the interaction between crops and other living organisms, not between crops and abiotic inputs—can be introduced into the thinking on agricultural productivity. Unlike biotechnology, knowledge and innovations in ecological intensification is location-specific and cannot be patented and are therefore unlikely to be developed by the private sector. Young scientists, chiefly at universities and independent research institutes such as the CGIAR, should therefore take up the challenge and study how we can better harness the synergies between crops, living organisms and modern inputs to intensify agriculture and to feed the expanding population.

(by Pepijn Schreinemachers)

Session 2: Sustainability Science: are new arrangements for scientific partnerships needed to address the integrated NRM targets of the reformed CGIAR

Session Summary

The session was a good mix of discussion on multiple aspects of theory, tools, approaches and frameworks to address the complexity of sustainability in the agriculture-environment nexus. The application of spatial tools to target the scaling of development interventions and GIS (Geographical Information System) for location based intelligence added a technical dimension for mitigation of complexities associated with sustainability science. A stimulating threads of discussions focused on re-centring the attention from ‘win-win’ situations to addressing right trade-offs. The concept of translation of ecosystems service approach to agriculture production systems was significantly highlighted.

Key observations

The discussions during the session on sustainability science centred on how partnerships and new research approaches can be used to respond to the challenges of increasing population, volatile global food prices, climate change and energy prices. The participants agreed on some principles but it is still

evident that there is no silver bullet to the challenges that the rural farming communities face. Among some of the key points that were extensively discussed are:

- Partnerships: It was a general consensus that the CGIAR needs to refocus towards working with national and regional level partners like NARS, Universities, Private Sector and NGOs. There were however divergent views on which nature these partnerships can be.
- Combination of research epistemologies and interdisciplinary research: Quantitative versus qualitative approaches- It was a general view that interdisciplinary and system based research is needed to address the current challenges that cut across different disciplines.
- Capacity building: There was an explicit suggestion that sustainability science cannot work without considering capacity building and induction of youth with system based framework.

Identified gaps

The discussions were open and focused, some structural gaps that can be worked upon

- Need to increase participation of young scientists/ youths within and beyond CGIAR
- Proportional time allocation for presentations and discussions in global gatherings
- Need to increase representation of the private sector
- Emphasis on some success stories/lessons learnt

Role of youth

In context of fostering the involvement of youth to address the sustainability challenge, the discussions did not elaborate on the mechanisms very explicitly. In order to nurture effective youth involvement as a long term mission, there should be a paradigm shift in decision making within the CGIAR to facilitate participation of young professional within CGIAR institutional structure in external discussions such as the Science Forum in a more active role. For example, the Science Forum organizers could plan to invite young scientist from CGIAR and second ensure a fair representation youth from all regions.

As the title of the session emphasizes on 'newer arrangements' for scientific partnerships to address sustainability concerns, it is suggested that knowledge domain of public-private-partnership be translated and updated as appropriate. To begin with, improved liaising with private actors in the agriculture and environment business value chains can be activity involved especially the 'young entrepreneurs' who have defined motive of societal change.

(by Maxwell Mkondiwa and Nidhi Nagabhatla)

Session 3: Metrics, monitoring and certification to support sustainable intensification of small-holder agriculture

Session Summary

The thematic discussion had relevance as the CGIAR identified priority areas for the term 2005-2015. The below stated observations are reported from the point of view of quantitative approach for natural resource management viz., PES (payment for ecosystems service) a framework that is closely linked with metrics session and referred to experience of ongoing work outside the CGIAR centres. The representative from the Gates Foundation (Greg Traxler) emphasized on the need for more structured data collection making a case for panel data which would make it easy for one to compare baselines with eventual outcomes. Tim Searchinger made a point of showing comparisons of the contributions to GHG emissions by cattle in Africa (7.5kg of GHG/kg of milk) and USA (1.3kg of

GHG/kg of milk), this difference coming about due to the efficiency of the latter production system. Jonathan Hutton (WCMC/UNEP) on the other hand made a point that there was currently little collaboration between agricultural science and biodiversity science, an area that needs to be addressed. Jeffery Bennett (ANU) made a presentation from a project conducted in China where farmers were paid to change agricultural practices so as to supply environmental services. It is important to have the correct tools to make the assessments (biophysical, financial and preference measurements and well as impacts of preferences) so as to use established BC analysis and that it is important to consider tradeoffs i.e. choices between competing alternatives involving different BC estimations.

Same sentiments were echoed by Colin Chartes (IWMI), who also pointed out the importance of incentive schemes such as PES, landcare programs and water stewardship especially when no immediate paybacks can be guaranteed to farmers since they (and governments too) pay more attention to financial measures, keeping in mind that immediate losses are stronger incentives than longer term rewards. Fred Luckey (Bunge, an agribusiness food company) gave an example of the value chain approach where the online field print calculator is on trial in Nebraska with 22 corn growers and this provides an example of the use of ICT which would enable farmers know how efficiently they are producing relative to baseline figures. Sandy Andelman (CI) gave a short synopsis of work under the organization Conservation International where remotely sensed *in situ* data (measurement layer), an analytical engine (analytical layer) is connected to the analytical outputs through a decision support system. Mike Robinson (FAO) also made the challenge about data posing the important questions of governance since in some countries, there was an absence of evidence based decision making.

Therefore, there is a need for investment in capacity to better utilize such data and undertake monitoring and analysis. Panelists concluded land use changes, population dynamics and their attendant consequences among key issues. Since many of these system wide dynamics such as climate change have their ubiquitous triggers, monitoring can be an issue as well. Therefore government agencies may not be better placed to manage the portfolio due to the multiplicity of agencies engaged in data assembly.

Key observations

Metrics are important since there will be need to get investments right and improve targeting and priority setting. There are outcomes that need to be measured from a baseline position to see how far things have developed over time. PES is an encouraging entry and many PES initiatives are currently being piloted. Probably there is need for an audience at one point to share this information and to also develop tools and methods utilized in these research activities. However, there are quite a number of things that are important to measure and some of those that were not clearly mentioned include institutional innovations (in the sense of rules and norms) that account the ‘must measure’ indices in relation to these institutions. Lately, there has been debate about homo economics and how some of the strong assumptions of rationality and selfishness upon which the whole discipline of economics relies have come under the lens. Since the youth have a different (malleable) social makeup, are there institutional innovations that can be put up in order to approach this group?

Identified gaps

One of the principal reasons why many shy away from agriculture is the poor image of individuals involved in agriculture. Are there research areas which can be tackled and which can advise on the best way of overcoming this constraint i.e. makes it sexy and lucrative? It is pertinent to address frequent queries such as: rather using BAD¹ data, we need to initiate programs which make it possible to conduct experiments within CGIAR research CRPs to collect a suite of good data. A case can also

1 Bad Available Data

be put to governments statistical agencies to collect data which can make such analysis possible. In addition, to address data uniformity, CGIAR is in a better position to stimulate the standardization of data collected due to its ability to traverse across country boundaries.

Other challenge is that the degree of resolution to monitor global commons is not as detailed as that required to monitor local commons, while mostly, the impacts are local and this systematically limits the capacity of the CGIAR to monitor the latter.

Role of Youth

Youths are interested in "sex" and "money" (quoted by one of the speakers, quite an unfortunate statement ...but looking at it again, we can use that as an opportunity; how can agriculture be made to look "sexy" and "lucrative"? At a time when the research community is embracing a value chain approach of doing research (this is hinted in the CRPs proposals and is also true in other contexts), we need to identify areas where the youth have a comparative advantage within the value chain and address the specific constraints as identified. In addition, it might be necessary that in future, as CRPs are being developed, there is a small provision set aside for young scientists to be mentored within these research activities. YPARD is an important channel to get this working. In addition, the CGIAR system might consider allocating a small portion of the research funding specifically for "young" researchers since an open competitive system leaves them at a disadvantage as it is very likely that most research opportunities will be taken up by the more experienced researchers. I did not quite see "young" faces presenting these papers at the forum although many would say that youth is not just age but response to ideas! The CGIAR system could have a panel of mentors working with young researchers to do exactly that, "mentor"! There is need to train more young scientists to replace those soon to leave the research system and then retain these experienced people with the idea of having them on call to provide guidance where necessary. It is important to integrate these young scientists into the research system early enough in order that they can grow up within the system and develop and also retain some important institutional memory as the research system(s) evolve.

The youth can be in the forefront seeing that they may have a greater propensity to adopt new ideas and are more easily malleable in terms of change in perceptions. This way, unemployment can be dealt a great blow. For instance, in Kenya, the Kazi Kwa Vijana programme (a government initiative aimed at engaging youth in economic activity) a research activity can be tried out by looking at the effectiveness of a concerted effort to link young producers with the school feeding program and as such evaluate the outcomes of such a move. If there are similar programs in other countries, the same is doable. This is an example of how we can put science to the test by employing randomized experiments such as that undertaken by Abhijit Banerjee and others at the Abdul Latif Jameel, Poverty Action Lab (J-PAL). Such experiments will tease out what factors are more important and what factors are peripheral in enhancing the engagement of youth in agriculture.

(by Stephen Mailu)

Session 5: Agro-biodiversity: an important contributor to productivity and the key to sustainability, nutrition and rural incomes

Session Summary

The session explored the extent of available knowledge along with the potential value and role of the use of agricultural biodiversity in meeting the sustainable production challenge and wider development needs. It also examined the potential risks of loss, whether consciously through production system choices, or inadvertently through agro-system disruption. The discussion and presentations touched on sustainable use of agricultural biodiversity, opportunities in crop diversity to increase yield and disease management, how agro-biodiversity can provide ecosystem services, the development of opportunity crops and threat of invasive species to agricultural biodiversity.

In the background note, it became clear that since the 1900s, some 75 percent of plant genetic diversity has been lost as farmers worldwide have abandoned their multiple local varieties and land races for genetically uniform, high yielding varieties. Thirty percent of livestock breeds are at risk of extinction. Currently, 70 percent of the world's food is generated from only 12 plants and farm animal species. While species extinction is a matter of increasing concern, changes in biodiversity in the world's agricultural landscape have largely escaped attention. A business-as-usual approach will fail to meet the needs of what is estimated to be a human population of 9 billion by the year 2050 and further deplete the viability of the planet's other species and ecosystem. The discussion also revealed the crucial role of the smallholder farmers as custodians of significant amount of the world's agricultural biodiversity, conserving and managing the agricultural landscape. It emerged that smallholder farmers are responsible for some 60% of total global agricultural production, and they make up the bulk of the world's poorest communities.

Key observations

There was a general consensus that the global community will need to come together around research-for-development agenda that focused on smallholder farming communities to significantly improve livelihoods, nutrition and ensure more sustainable and resilient agricultural systems through the improvement and maintenance of diversity. Smallholder rain-fed agriculture must not only be made more resilient to climate change, its productivity must dramatically be increased by deploying inputs that do not further increase the risk of crop loss and financial failure under greater climatic variability

The main point of this session was the use of agricultural biological diversity for increasing sustainability, productivity, nutrition and rural incomes. Key points were the importance of biodiversity for improving the livelihoods of smallholder farmers and the nutrition and health of populations. Also, increasing biodiversity of crop may help increase crop resilience and nutrient acquisition. It was also noted that agro-biodiversity may be increased in agricultural landscapes both by intercropping (planting two or more species in the same field), or by rotating crop (having a matrix of plots with different species, but having monocultures at each plot), and that intercropping may not always be beneficial. Thus, the gain from agro-biodiversity may depend on the scale (from plot to landscape). The risks related to invasive species were also emphasized. The existence of initiatives for fighting these species was reassuring, specifically the Plantwise initiative, that provides community-based plant clinics that deliver advice to farmers facing threat from invasive species.

In the developing world taking Ghana for example, 60 to 70 % of the population engages in agriculture and its supporting services. The farming practice in this part of the world has been mixed cropping or farming system for ages. It is true also that these farmers are the poorest of the poor. It was said at the science forum that the average age of a cocoa farmer in Ghana is 55 years. The question is how can agriculture be made attractive to the youth, how can poverty be eradicated and how can we keep small scale farming for the sake of agro-biodiversity conservation. This topic was debated at length. However, from my point of view, the CGIAR has to devote more time and resources to address it.

For the young man to go into farming, he or she would surely be targeting bigger market which demands uniformity. Poor yielding land races would have to be replaced with high yielding new varieties with high uniformity. For instance there is a big yield gap in the cereals and legumes between African and European varieties. The attempt to lure the youth into farming would surely affect the choice of varieties. We therefore have to give a serious consideration to the future of agriculture and agro-biodiversity conservation.

Identified gaps

There were a number of presentations, all thoroughly discussed. There are few areas demanding on greater attention of CGIAR *viz.* rewarding small scale farmers (grassroots level incentive structures), poverty reduction (impact based) and the future of agriculture (foresight).

Risk and uncertainty are inherent parts of these farmers' daily lives. The important issue is to ensure that smallholder farmers 'economic and social' livelihoods are guaranteed and mechanism to incentivize them to promote and sustain agricultural biodiversity defined. Biodiversity may also be useful through the existence of "development opportunity crops" (non-staple crops that have been neglected but may have ecological, nutritional and economic benefits). Research on the benefits of such crop should be increased, especially in a context of climate change and the dramatic increase of mal-nutrition in the world.

The problem of motivating youth to engage in agriculture and reducing migration to cities remains an important interrogation related to agro-biodiversity. The talks in this session did not discuss this point although it was acknowledged in the discussion as a major problem that should be addressed.

Role of youth

Motivating youth to engage in agriculture seems very challenging. Suggested way to do this could be by involving young people to collaborate with initiatives like development opportunity crops and plantwise clinics. Young farmers may focus their energy, enthusiasm, and fast learning abilities on helping their own community generate more income and increase their production and livelihoods. Also, given the interest of young people on technology, this may be used as a hook to motivate youth to stay involved in agriculture. Also, activities such as farmer field schools and workshops should focus on involving young people. If we could get some young farmers to successfully engage in agriculture maybe others would follow their example. Engaging youth in agriculture is a very important subject that should be included in the agendas of most, if not all, agricultural development programs.

From the perspective a younger generation, it became evident that, we have a very essential role to play both as researchers and entrepreneurs in agriculture. As young researchers, what will be our commitment to ensuring adequate security for smallholder farmers in terms of their social and economic livelihoods so that agriculture becomes a lucrative business rather than the perceived poor man's venture? Where do we want to see the smallholder farmer in the next 20 years? These were some perspectives that emerged from the discussion. The onus lies with young researchers to be proactive, to undertake demand-driven and results- oriented research that will address the questions raised during the discussion. We have an existing platforms set by the current and older generation of agricultural researchers, and we as young researchers and agriculturalist have the ability and capacity to change the status quo in order to suit emerging global trends in agriculture.

(by Ernest Nti Acheampong, Verónica Crespo-Pérez and Kenneth Fafa Egbadzor)

Session 6 Animal protein: increased production and a healthy environment in conflict

Session Summary

Maggie Hill from ISPC hinted that though fish consumption increases with increases in incomes, it should not be forgotten that fish is a major protein source for poor households. By 2050, the demand of fish by humans and livestock is estimated as 480 million tons and 430million tons respectively with

livestock also demanding an additional 1,040 million tons of grain. Stephen Hall (World Fish Centre) made an overview of both capture and aquaculture fisheries with the latter growing much faster over time. The other talks focused on pastoral systems and concluded that converting land from communal to private use undermines otherwise resilient pastoral systems also explaining about the grasslands project in China. Since 1980s, grass became too short for cattle and this saw a rise in numbers of sheep and goats as a replacement. The project has a goal of rearing 120,000 lambs in 2011 working with 200 herders in Mongolia, an initiative that has also reeled in a private company which would offer a 30-50% price premium per kg when lambs reach a 30kg target in 12-16 weeks. Furthermore, discussions on scientific opportunities to overcome the challenge of increased demand for food and feed and addressing as post-harvest loss reduction, plant and animal genetics, feed additives/gut health and feed formulation were listed as key areas for intervention.

Expert from the Chinese Academy of Agriculture Science (CASS) explained the strides in China in the use of livestock waste to the extent that in China, there are about 40 million household biogas digesters with gas generation estimated as 11.2 billion m³ in 2010. Poultry manure to power project (investment of 665m RMB) with carbon credits would manage a GHG reduction of 84,000t CO₂ and an IRR of 19.44% within a 5.6 payback period. A review of work concerning the interface between livestock and wildlife highlighting the environmental and disease challenges associated with the developments concluding that there was still room for more research (emphasizing on to be launched CRP4) focusing on agriculture and human health was the highlight of the follow up talk. The session concluded that research issues needs to be directed with a more system focus in order to integrate environmental health into agricultural technologies giving a reference of a Norwegian company that accounts its carbon footprint i.e. including in the cost of producing feed to include how far the feed has travelled so that preference is given to ingredients which have a smaller carbon footprint.

Identified Gaps

Animal protein can be intensified without having a negative impact on the environment if an eco-system approach to agriculture is carried out. This involves carrying out EIA's in order to obtain guiding principles and management plans that farms should follow during and after operation that would lead to corrective actions and decision. These management plans can be implemented at farm level; water shed level and global level.

Farm level: These involve voluntary action from fish farmers. They include good management practices like safe use of chemicals, good feeding techniques and use of environmentally friendly agriculture technologies like integrated farming systems.

Institution level: A given organization takes responsibility of the ecosystem by enforcing actions that can protect the resource. For example maintaining an agreed biodiversity and enhancing green infrastructure.

Global level: If agriculture is intensified to increase food supplies, it should reduce its resilience on the ecosystem and meet the market demands through fair trade, considering all EAA guiding principles.

However in order for these to be achieved it needs joint community involvement and government efforts. It is also important for scientists to communicate agriculture eco-system conservation issues clearly and briefly in forms that can easily understood by policy makers. It is further argued that focus on supplementary species as explained in the session summary may not require heavy investments and their effect on ecosystem integrity is minimal. It was observed that research focus of the CGIAR system is not primarily on some of such species example rabbits. Identifying that as an opportunity to diversify in involving the "youth" in the rearing of say insects such as termites and other alternative protein sources which can then be used in the animal feed industry as a replacement for the traditional and often more expensive protein sources (such as fishmeal). Question is, is this feasible from an economic viewpoint?

Role of youth

With reference of the above points Stefan Mailu states that the outlook for livestock feed and human foods, which are in direct competition with each other is something which we in KARI are also struggling with. Most recently, feed prices have been on the rise. At the same time, corn, a major food commodity was also in short supply signaling that more needs to be done to arrest such incidences. In Kenya, an initiative to involve “youth” by the government called as ‘Kazi kwa vijana’ (work for youth) is aiming to sensitize the youth. While in other instance, some livestock species e.g. rabbits are closely related to Kenyan youth and maybe if the research issues are made clear, it could be an area to consider investing research time and funds.

(by Stephen Mailu and Erina Princess)

A needed focus: Youth Involvement in the Agriculture-Environment Nexus

It was commonly agreed by all the young professionals that sensitizing the youth involvement in agriculture production and environmental conservation is vital. It was reasoned that to gain attractive financial returns from the agriculture, the new generation of agriculturist need connection to technology support and institutional/ policy backing to optimize the production. In many developing countries youth still use traditional means of production, thereby not gaining much return from their investments. This calls for sensitization, capacity building and participation. Diverse perspectives for effective involvement of youth in agriculture were discussed by the Young Professionals among themselves and with the experts. Some key points include

- ✓ Research on profitability of agriculture or agriculture as a profitable venture is pertinent in order to align with the broad objectives of food security.
- ✓ Capacity strengthening on practical skills in agriculture for increased productivity, crop diversity and knowledge technology transfer looks as indispensable investment
- ✓ Monitoring and evaluation of youth participation in agriculture and their access to agricultural production resources and services
- ✓ Need of agricultural policies intend to assist rural youth in context of capacity building both at farm level
- ✓ Integrate agriculture courses at the primary and secondary education system can play an effective role in enhancing the interest and attention of young minds.

In support of the above argument, Erina Princess from Uganda underlines the suggests how youth involvement in agriculture can be improved

- **Loans and grants:** Many youth are faced with the challenge of lack of capital which limits access to farm inputs and resources like land. Provision of loans or grants to youth interested in agriculture can enable them purchase a needed farm inputs and obtain access to resources.
- **Extension Services:** Lack of knowledge on good farming skills results in low farm yields hence less profit. However, provision of technical advice through extension services could improve farm yields which can encourage more youth to invest in agriculture.
- **Documenting and disseminating testimonies:** A number of youth are more interested in white collar jobs as opposed to agriculture due to the mentality that agriculture is meant for the rural poor. There for, documentation and dissemination of testimonies of youth that have made achievements by carrying out agriculture can act as an incentive for others to join
- **Agriculture in Education Curriculum:** Efforts can be made to promote practical agriculture courses in Universal primary and secondary education. Students can be awarded marks based on their performance in practical field work. This will increase interest and improve their skills in agriculture.

- **Funding projects that enhance youth agriculture activities:** Majority of people involved in agriculture are old women and very young children. Projects need to be funded that can enhance agriculture youth involvement in order secure food availability for the future generation. However, these projects should be well managed and monitored in order for their outputs to be achieved.
- **Youth representation in agriculture programs:** Youth should be represented in a number of agriculture programs and given the opportunity to voice their views. This can serve to obtain the perception and contribution of youth in agriculture activities.

Concluding Remarks

Participating in CGIAR Science Forum- 2011 was an outright knowledge gathering experience and provided an insight into the great and unique potential that global collaboration holds in solving or better said tackling the enormous multitudes of issues facing our planet today. 'Agriculture-Environment' Nexus was a very relevant theme for the forum and the discussions around the topic were quite enriching. From a young scientist's point of view, the experience was fulfilling and motivating and energized the young generation of researchers to continue with the effort to contribute towards enriching research in agricultural science and environmental sustainability.

To keep up with the rising demands of food worldwide, the sustenance of agriculture as a livelihood option needs to be retained. Ypardians agree that the active involvement of youth in agriculture would require new approach to address increased productivity and profitability in terms of policy and institutional support, technology application, improved market links and capacity building. It was also particularly refreshing to hear suggestions of all inclusive mechanisms involving farmers, policy makers and scientists and the need to always reconcile scientific knowledge with local knowledge, from local to global we believe this hold the key to future success.

The exposure to Chinese experience is particularly important to the developing countries especially in Sub Saharan Africa so as not to repeat mistakes it in their quest to achieve food security. It is however inspiring to hear the great efforts the Chinese are employing to mitigate the damage their past agricultural practices has done to their lands. A special mention of the amount Biogas that they are currently generating from Animal manure alone is amazing.

The young professionals opined that for moving forward on the agreed tracks there must be agreement on key research questions to be answered and such agreement must be based on universally harmonized indicators acceptable to all stakeholders. The contributions of the young scientists at the conference were visible and acknowledged. Some of the experienced scientists already suggested the significance of involving the youth in future meetings of such nature. We strongly recommend the participation of young scientist in future Science fore.

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Annexure 1 Questions and comments made during the CGIAR at the Science forum in Beijing, China on October 19th, 2011

Questions

1. Currently in Uganda, the Aquaculture research center of the National Fisheries Resources Research Institute (NaFIRRI) is developing a database and map for all the aquaculture fish farmers in the Country. What are the cost effective means of updating this database, considering that Uganda is a third world country?
2. Cage fish farming is a new technology in the country, which has a bigger potential to produce higher fish yield as compared to other production systems (ponds and tanks). How can cage culture be intensified to meet the growing food demand without having a negative impact on the environment?

Answers

1. World Fish Center is starting a fish project in Uganda and could be of help to the Aquaculture center by practically demonstrating the means in which data can be well managed and updated.
2. Some of the measures that can be taken to conserve the environment while intensifying cage culture include: Proper management practices like animal health management, fish mortality removal plus disposal, cage site rotation to allow recovery time for local benthos, optimising feeds and feeding strategies in order to reduce nutrient and organic matter load