Food and Agriculture Organization (FAO)

Islamic Chamber of Commerce, Industry & Agriculture
La Chambre Islamique de Commerce, d'Industrie et d'Agriculture

The Perez-Guerrero Trust Fund for South-South Cooperation (PGTF)

Report of the Workshop on Promoting Green Growth and Technology in Food, Water and Energy Nexus for OIC Countries – Challenges and Opportunities

2 - 4 December 2019
Karachi – Pakistan

Draft Report of the Workshop on
Promoting Green Growth and Technology in Food-Water and Energy Nexus
for OIC Countries – Challenges and Opportunities
ICCIA's Headquarters, Karachi, Pakistan
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Preamble:

The Islamic Chamber of Commerce, Industry & Agriculture (ICCIA) in collaboration with the Perez-Guerrero Trust Fund for South-South Cooperation (PGTF) and the Food and Agriculture Organization of the United Nations (FAO) Regional Office in Cairo organized a Workshop on "Promoting Green Growth and Technology in Water, Food and Energy Nexus for OIC Countries – Challenges and Opportunities", from 2nd – 4th December 2019 at the Headquarters of ICCIA in Karachi, Pakistan.

Rationale of the Workshop:

Islamic Chamber of Commerce, Industry & Agriculture. (ICCIA) as a business and investment engine, has been undertaking various initiatives for the benefit of the Member States, in the field of trade, commerce, agriculture, information technology, promotion of investment opportunities and joint ventures in the Member countries. In addition, it undertakes programmes on capacity building, poverty alleviation, upgrading marketing and managing skills, value-addition, agribusiness, gender development, economic empowerment of women, promotion & development of Small & Medium Enterprises, utilization of microfinance, developing Entrepreneurship, particularly in youth, development of tourism and promoting the concept of Halal Business.

In response to increasing population and incomes, FAO's global programs such as world food and agriculture set targets in food production towards 2030/50 in different parts of the globe to meet the growing demand. Further, FAO now also highlights the conceptual framework for investigating Environmental Livelihood Security (ELS) combining concepts of the water–energy–food–climate nexus with that of sustainable livelihoods framework in order to achieve a sustainable balance between natural supply and human demand.

The Workshop initiative also arose due to the perceived deficiency of inter-disciplinary discourse in the field of managing water, energy and food nexus and to a recognition that a lack of dialogue poses a significant obstacle in the effective application of Nexus management policies. As a result of the communication barriers, each discipline tends to operate to a large

extent within their sphere of policies, rules and regulation. For example, engineer/hydrologists, might be unaware of the potential of other disciplines such as economist, environment specialist and sociologist who can play a role in formulating policies that can be cost effective and environmentally friendly. Further, as a result of evolving policy and environmental paradigms, concern has been articulated that past emphasis on one sector – water, energy of food misses the integrated nature to solve problems in cost effective way.

Agriculture is also one of the top economic priority areas of the OIC 2025 Program of Action. Moreover, agriculture is also given utmost consideration as one of the Top Seven Areas of Cooperation that is pursued by COMCEC at the level of the OIC Member states through a COMCEC Agriculture Working Group. In order to implement the activities coming within the priority areas of the OIC Program of Action, the OIC Institutions share their experiences and expertise to add more value to the activity.

The Workshop was attended by more than 30 participants from 14 countries namely: Afghanistan, Azerbaijan, Egypt, Ethiopia, Indonesia, Iran, Kazakhstan, Malaysia, Morocco, Nepal, Nigeria, Palestine, Pakistan and Tajikistan, representatives of Private Sector; Green Technology; Social Sector working in the domain of environmental preservation; Chambers of Commerce and University representatives. In addition, representatives from United Nation Development Programme (UNDP), Pakistan and Food and Agriculture Organization of the United Nations (FAO) and the Statistical, Economic & Social Research & Training Centre for Islamic Countries (SESRIC) also participated the workshop.

Objectives of the Workshop:

The overall objective of the workshop was to (1) to identify and characterize strategies linking needs of stakeholders with scientific knowledge base in the pursuit of appropriate policy response to address the Water, Energy and Food nexus (WEF) among OIC countries (2) assist participating OIC countries to integrate green economy and technology into planning, policy formulation and program development processes by advancing incentives to users and making the necessary institutional changes. The following specific objectives were also achieved:

(a) Participating countries were sensitized about the key components of WEFN and the importance of developing green economy and technology in OIC countries;

(b) Concepts, development processes, and management of WEFN and green technology-based businesses were showcased with a special focus on OIC Countries' experiences;

(c) Cross-country best practices for the management of green economy and technology was shared;

(d) The current state-of-the-art in use of eco-efficient green technology that would shift development paradigm from natural resources degradation to their preservation and sustainable use was analyzed;

(e) Opportunities were explored to integrate green growth into relevant policies, legislation, standards and norms at country level.

Format of the Workshop:

After successful completions of similar workshops in Uganda (2010), Ankara, Turkey (2014) and Istanbul, Turkey (2016), this workshop was held in Karachi, Pakistan at the Islamic Chamber of Commerce, Industry & Agriculture (ICCIA). The workshop covered three thematic areas to meet the objectives;

(1) Concepts, challenges of policy options for WEF nexus
(2) Developing green technologies - Lessons and Innovations
(3) Greening economies and policies

The three-day meeting consisted of technical sessions in identified themes, followed by question and answer sessions. Furthermore, there were Case Study sessions for participants to present specific examples, new initiatives and innovative ideas. The deliberations also encouraged presentation of work at national/sub-national levels and to facilitate peer learning.

The Case Study session also allowed participants from OIC countries to share their experience. Examples of case studies presented were:

1. Paradoxical Agriculture – Greening the Agriculture Policies (Ongoing Research Work at Wit/LUMS)
2. From water-energy barter to market-based solution in Central Asia, a case representing, the case of a transboundary issue providing a solution wherein the net benefit for the basin is higher, when the reservoir follows an irrigation regime, as oppose to a power regime
3. Impact of Energy Subsidy on Agriculture – Case of Albatina Region in Oman
4. Thoska Project in Egypt - A Project or from the 'Fourth Pyramid' to an incomplete cathedral in the desert
5. Potential of Making Thal Desert Bloom in Punjab, Pakistan through investments:

Workshop Proceedings:

The workshop was opened in the morning of 2nd December with the recitation of verses from the Holy Quran.

Mrs. Attiya Nawazish Ali, Assistant Secretary General of the ICCIA welcomed all the distinguished guests and participants at the ICCIA's Headquarters in Karachi, Pakistan. In her opening remarks, she thanked the Perez-Guerrero Trust Fund for South-South Cooperation (PGTF) and the Food and Agriculture Organization of the United Nations (FAO) Regional Office, Cairo, Egypt for extending their generous financial support towards the organization of this important workshop. She highlighted the importance of greening the economies of OIC Countries as well as the role of ICCIA in developing the economies of the OIC Countries and its contribution towards achieving the Sustainable Development Goals and OIC Program 2025. She also highlighted the strategic programmes of the ICCIA which focus on projects that can add more value to the economies of the OIC Countries and attract investment.

On behalf of FAO, Islamabad, **Ms. Robina Wahaj**, Technical Officer, Land and Water Division, FAO Pakistan highlighted the need to understanding and managing the complex interactions between water, energy and food security which is essential to cope with changing climate and for achieving the Sustainable Development Goals. She highlighted that FAO approach to the Water-Energy-Food Nexus describes the complex and inter-related nature of our global resources systems with social, economic and environmental goals. Uptake of new technologies, changes in agricultural and water management practices by small holder farmers with concurrent actions to help conserve natural resources and protect our eco-systems will pave the way towards Food Security and the eradication of malnutrition in all its forms. She also assured full FAO support for such an events.

Technical Sessions:

Session 1 - Agriculture, Water and Energy: Concept and Challenges:

First presentation was made by **Dr. Abubakr Muhammad**, Executive Director, Center for Water Informatics & Technology (WIT), Lahore University of Management Sciences (LUMS) on Introduction to Water–Energy–Agriculture Nexus in the Context of OIC Countries. He introduced the concept of Precision Agriculture in Managing the Nexus – sharing WIT/LUMS Experience. Then he highlighted the necessity of a multidisciplinary approach to address socioeconomic and environmental challenges including that of climate change. Emphasis need to be placed on an evolving system approach that integrates various components of natural capital of a region – the most important being land, water, energy usage in food production. At the end he alluded to greater need than ever to better understand this interconnected system considering the growing concern of OIC region where key sectors like agriculture and water are being further threatened by climate change.

Mr. Asif Sheriff, CEO PEDAVER and Progressive Farmer made a presentation on **WEFN-Paradoxical Agriculture- Farmer Perspective.** He provided an overview on how old agricultural practices based on natural process thrived for millions of years, but with introduction of present-day mechanized farming, our production system is becoming unsustainable. As modernization based on mechanization is taking place, there are two options, either to stay on the path by increasing the use of chemical and other wasteful inputs, resulting in unsustainable pattern of growth or to revert back to adopting natural processes of soil fertility and vegetation to build a sustainable process for future agriculture, a process which is in line with natural ecosystem, or build on evolved system or ongoing practices of tillage-based farming to be followed and augmented. Mr. Sheriff explained that in the natural ecosystem, biota provides balanced amount of minerals to the plants. Killing it could make a room for agrochemicals, this is exactly what was done, by the cartel of commercial interest. Mr. Sheriff identified four factors in natural ecosystem:

1. No inundation of Soil
2. No disturbance of Soil
3. Soil covered with organic mulch
4. Biodiversity

He further added, Paradoxical Agricultures (PA) is a new branch of science for agricultural production, entirely based on natural process of soil fertility and vegetation; science of ecosystem. We are getting higher yields than conventional agriculture, without any purchased input, except for seed and little amount of water/rain.

Dr. Mahmood Ahmad, Lead Workshop Trainer, (Ex FAO Senior Policy Officer and Center for Water Informatics & Technology (WIT), Lahore University of Management Sciences (LUMS) presented on Greening Growth and Policies: "Green Rice Cultivation" Case of Paradoxical Agriculture. The presentation supplemented the work presented by Mr. Sheriff Asif. Dr. Ahmad explained the agriculture sector crisis in the context of nexus. A real comparison of sustainable and unsustainable production practices was made. A production system is sustainable if the farming practices impose few or no negative environmental externalities and creates limited or no environment degradation. He emphasized on the paradoxical agriculture and shared its practices which are as follow:

- Crop production from within the natural ecosystems
- Replica of natural process of soil fertility which relies on natural process of soil fertility
- Few or no purchased inputs

The results presented showed significant returns to reduced use of four key inputs, and economic profitability for sustainable farms increased almost twice, as reflected in enhanced efficiency of domestic resource cost. The study also finds that the 'costs of compliance' are offset manifold by the larger, higher-quality yield, as well as the lowered input costs. In our view the pioneer policy work points to a win-win outcome by adopting paradoxical agriculture that can enhance competitive advantage, sustainable growth (eliminating environmental pollution) making small farmers inclusive and contributing to poverty reduction and making Pakistan/Punjab as future agriculture export hub for CPEC and beyond

Dr. Sanval Nasim, Assistant Professor, Department of Economics, Lahore University of Management Sciences (LUMS) made presentation on **Green Economy Enabling Environment: From Command Control to Market Based Solution**. Dr. Sanval's session addressed both the conceptual and practical applications of economic theory to the dilemma of managing the Nexus. He approached the topic by dividing it into the components of command and control policies versus market-based solutions. He emphasized that there is growing policy shift for moving towards market-based solution with varied policy options. Dr. Sanval provided detailed account of an alternate to emission charges and abatement subsidies mechanism which are market-based systems. Under a cap-and-trade scheme, the regulatory authority decides the total allowable quantity of aggregate emissions—the "cap"—each season. It then generates permits (or allowances) equivalent to this quantity of aggregate emissions and distributes them to farmers according to predetermined criteria. After farmers/or polluters receive their permit allocations, they can trade these permits in specially established markets or exchanges. He emphasized that as long as permits are fixed, farmers will benefit from participating in the market. For the cap-and-trade policy to be effective, the regulator needs to ensure smooth functioning of permit markets.

Ms. Robina Wahaj, Technical Officer, Land and Water Division, FAO Pakistan made presentation on **Greening Economy: Water Auditing and Accounting**. The presentation explained that Nexus is balancing different resource user goals and interests –while maintaining the integrity of ecosystems. FAO has identified three working areas to identify, assess and manage Nexus interactions, considering the impacts that any change – a policy decision, a large-scale investment or a change in agricultural practice – which can have beyond the intended objectives and scale. The working areas are:- a) evidence, b) scenario development, and c) response options.

She explained that they do not describe a linear set of steps, but rather are complementary areas of work that are interlinked by stakeholder dialogue. Data, analysis and scenarios are part of a Nexus assessment, which inform stakeholders about Nexus interactions, highlighting trade-

offs and synergies between different resource uses. This can provide the basis for a dialogue process to develop and decide on response options to use and manage the resource base in a more coordinated and sustainable manner. Dr. Robina also provided a brief on MASSCOTE that supports process of technical and managerial upgrading of irrigations schemes to improve resource use – that includes labour, water, economics, environmental impacts and water delivery services to users. In brief the tool;

- Helps farmers benefit from improved services
- More water users, as less water is wasted
- Irrigation professionals get trained and know how to run their system better

At the end she provided a brief on Water Accounting tools and highlighted that FAO promotes water accounting and auditing as mutually supportive processes and promotes flexible, problem-focused, Water A&A approaches

Dr. Fozia Parveen, Post-Doctoral Fellow and Adjunct Faculty, WIT/LUMS made a presentation on **Wastewater Treatment Technologies and Management in The Mediterranean Region of OIC "the Case of Jordan".** In her presentation she shared the work she had carried with UNICEF Jordan in optimizing the performance of wastewater treatment plant in a Syrian refugee camp, Al Zaatari in the year 2017. She looked at the performance of trickling filter as well as membrane bioreactor technologies for wastewater treatment and the propositions made to improve and optimize the setup. She then related the refugee crisis situation as an unplanned event and the follow up issues of wastewater treatment to cities like Karachi Pakistan which are growing bigger and bigger in size with no wastewater treatment in place.

There was an emphasis on how wastewater is upto 99.9% water and is more a resource than waste. The fact that most of the countries in the OIC region except for the Mediterranean countries overlook this resource is something that the region needs to look into, to reclaim as much water as possible closest to where the demand is instead of continuing to meet demands. The reclamation and treatment that take place with the help of advanced technologies with lesser footprints and countries need to make it a priority to meet their increasing water demands.

Dr. Husam Al Hudhud, Deputy Project Manager FAO PAL WBGS made presentation on **Water Use Optimization and Rationalization: The Case of Palestine**. The presentation briefly described the water situation in Palestine and the efforts made to restore water availability and accessibility for agricultural use. Given the increasing demands for water in competing sectors, the need for water use optimization and rationalization in irrigation was highlighted through the provision of applied interventions examples. It was emphasized that

the latter was applicable only through participatory approaches that involves water users' associations and stakeholders. This aimed in particular to better manage and maintain irrigation infrastructure for more efficient use of water.

Dr. Abdel-Aziz Ibrahim, Agriculture and Water Expert, Professor, Institute of National Planning, Egypt made presentation on **Trade in virtual water and the Nexus- selected cases from OIC countries.** He highlighted the fact that for a water-scarce countries/regions it can be attractive to adopt a policy of producing and exporting products with relatively low virtual water contents and importing products having higher virtual water content. In this context, the import of wheat in Egypt is contributing to a national water saving of 3.6 BCM/year which is about 7% of the total volume of water Egypt is entitled to according to the 1959 agreement. The national saving is made with the investment of foreign exchange of 593 million US$/yr. The concept is also very important in preparing water and food accounting is water scarce countries of OIC.

Session 3 - Greening Economies: Policies and Regulations

Dr. Abdel-Aziz Ibrahim, Agriculture and Water Expert, Professor, Institute of National Planning, Egypt made presentation on **Groundwater Management and the Nexus – Key to Agriculture Development and Economies**. He presented the case study of Yemen's Groundwater and Qat's (crop) production. Qat consumes vast quantities of limited ground water, reducing the availability of strategic crops and high-value commodities that contribute to foreign exchange and improve food security conditions in the country. Thus, the problem will not be in Qat cultivation or not, as the current status quo will lead to the disappearance of irrigated agriculture for future generations, especially in the main basins. Dr. Aziz presented a case of Ethiopia, which also grows Qat with adequate water resources, providing opportunity for Yemen to import the demanded commodity at lower cost and saving much needed water whose demand in competing sector is growing and so is willingness to pay.

Ms. Aeyesha Gulzar, Country Director-Pakistan, JE Austin Associates, Islamabad presented **Innovative Ideas in managing the Nexus.** The presentation pivoted on introducing a spatial planning approach in developing regional clusters based on competitive and comparative advantage for development of the WEF nexus. Spatial planning involves evaluating agriculture, industries, infrastructure and resources to develop competitive growth corridors for balanced socio-economic growth harmonized with environmental concerns. The presentation was referred the Punjab Spatial Strategy from Pakistan as a case study and highlighted pilot examples from the country. She outlined the steps to maximizing WEF potential by efficient use of resources, to enhance productivity and generate value addition; increased incomes of

the Farmers (eliminate high rural poverty and malnutrition), transforming subsistence inward looking agriculture to export oriented high value crops; from low productivity & inefficiency to increased total factor productivity (Eliminating Inefficient use of water, land and people). Then the use of innovative technology like solar driven access to water, energy cogeneration in sugarcane and tapping huge potential of biogas can be promoted.

Ms. Jamila Nawaz, Community Based Disaster Risk Management Specialist, FAO Pakistan made a presentation on **Climate Smart Agriculture (CSA) in OIC Countries.** In her presentation she shared practical and cost-effective climate smart initiatives successfully done and replicated by FAO in the provinces of Punjab, Khyber Pakhtunkhwa and Sindh in Pakistan with small scale men and women farmers. At the provincial level FAO assisted the government in revising the Provincial Agro-Ecological Zones for Punjab and Sindh (after 1980). Another milestone achieved during the last two year is the development of provincial level Climate Smart Agriculture profiling for Punjab. Further she shared the practical example of Integrated Pest Management (IPM) making compost and liquid fertilizer, fodder growing through hydroponic, hay and silage making, intercropping and vertical gardening. At the end three recommendations were put forward as follows:

- Smallholders need institutional and financial support for the transition
- Strengthened institutions for dissemination and coordination
- Consistency between agriculture, food security and climate change policies

Dr. Krishna Pant, Chief Technical Advisor, FAO Nepal made a presentation on **Climate Resilient Agriculture for Green Growth: Key Concepts and Learnings from Nepal**. Agriculture can contribute to green economy as it plays a vital role in the economy, employment, food security, trade flows, poverty reduction and human health. But in recent decades, the agriculture sector is facing several problems, particularly, declining rates of growth in productivity; decreasing share of global agricultural exports from developing countries; increased use of agrochemicals; increasing levels of GHG emissions; and inequitable distribution of benefits among countries and societies. Sustainable agricultural production system is necessary to address all these problems.

Dr. Sanval Nasim, Assistant Professor, Department of Economics, Lahore University of Management Sciences (LUMS) made a presentation **on Environmental Valuation and Pricing: Pakistan's Fading Aquifers.** The presentation highlighted the importance of Groundwater: as an important source of irrigation in Pakistan's Indus Water Basin and since 1960s it is unmanaged with extraction of groundwater which has led to the continuous depletion of the resource in most parts of Punjab and its quality has also deteriorated over time, with adverse impact on land productivity and farm profits. Dr. Sanval suggested policy interventions required to control the unsustainable use of groundwater in Pakistan, that require creating

enforceable property rights, putting in place appropriate regulatory institution, creating credible valuation of services that is geared towards instituting full cost pricing of this valuable resource. The possible policy instruments include: Optimal groundwater tax with the possibility of tradable permits seeking innovative solution that look not only at engineering solution, which is a common practice. To have a supporting policy to create water storage at all levels and make people pay for water as a valuable commodity that we and our future generations need.

Session 4 - Greening Economies: The Case for Food Loss, Waste Reduction and CSA

Dr. Jozimo Santos Rocha, Regional Agro-Industry Officer, FAO RNE made a presentation on **Pursuing Environmental Objectives by Reducing Food Loss and Waste**. Highlighting that allowing food to be thrown away when more than 820 million people in the world continue to go hungry every day, does not justify such large volumes of waste. Further, losing food implies unnecessary pressure on the environment and the natural resources that have been used to produce it in the first place. It essentially means that land, water and energy resources have been wasted, pollution created and greenhouse gases (GHGs) emitted to no purpose. FAO is in the process of replacing by two indices, based on joint efforts by FAO and UN Environment to estimate precisely how much food is lost in production or in the supply chain before it reaches the retail level (through the Food Loss Index) or is subsequently wasted by consumers or retailers (through the Food Waste Index). Initial estimates made by FAO for the Food Loss Index, tells us that globally around 14 percent of the world's food is lost from production before reaching the retail level. Estimates for the Food Waste Index are under preparation by UN Environment and will complement the Food Loss Index to provide a better understanding of how much food is lost or wasted in the world.

Dr. Birhanu Zemadim, Senior Scientist, Land and Water Management International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) from Ethiopia presented **a case study on CSA from Africa**. He emphasized the need to think out of the box, hence promote more cooperation and partnership to utilize shared resources among different nations. Further, while promoting low cost traditional practices, there is a need to focus on informed result-oriented decisions and Invest on cost effective agricultural water management practices. There is also need to work on optimal management of resources. Adopt practices that are workable for farmers and consider the five-domains of agricultural practices, productivity, environment, economic, social and human domain in promoting CSA practical.

Session 5 - The Enabling Environment for Greening Economies

Dr. Mahmood Ahmad, Lead Workshop Trainer, (Ex FAO Senior Policy Officer and WIT/LUMS) made a presentation on **Water, Energy and Food Nexus – Unfinished Business-Cases from OIC**. He presented four cases from OIC countries namely:-

First: Moving from Water-energy barter to market-based solution in Central Asia, a case representing transboundary issues providing a solution that created net benefit for the basin much higher when the reservoir follows an irrigation regime than it follows a power regime. The countries debating, which option to adopt in solving this long standing water, energy sharing dispute.

Second: Impact of Energy Subsidy on Agriculture – Based on FAO work the case study from Oman presented the impact on agriculture cropping pattern of reducing energy subsidy. A number of policy scenarios were considered, which assessed the impact of enhancing electricity price on economic efficiency of crop production as measured by Domestic Resource Cost of each crop. It was found that lemon, banana, potato, onion, dates and rhodes grass are highly sensitive crops to changes in the electricity price because these crops consumed huge quantities of ground water.

Third: A Project attributed as 'Fourth Pyramid' to an incomplete cathedral in the desert--Toshka project' in Egypt with the aim of building 240 km canal that would have 'turned a desert into green pasture' as much as 3.4 million *feddans* of virgin land (about 15,000 sq./km) that would have been destined to the cultivation of high-quality vegetables and fruits to sell in European Markets. Three-year delay in the construction of the sole pumping station were at the center of a major debate for delay and stalling of the project. The Toshka Project is still in the process and the expected outcome where nexus is expected is yet to play a major role.

Forth: Potential of Making Thal Desert Bloom in Punjab, Pakistan through feasible investments options: (1) Introducing supplementary irrigation in rainfed area by growing gram, a widely used food pulse; (2) using low diesel tube wells in combination water available expected from new canals being planned --- can transform rainfed to irrigated agriculture and (3)finally using modern technology such as Solar Tube well/High irrigation efficiency system (HIES) for Irrigated Agriculture combined with forest shelter belts to reduce temperature can provide a unique opportunity of making desert a food basket not considered before. It provides a good case where water, energy nexus can provide huge agriculture potential for growing high value crops for domestic and export markets including CPEC and beyond. Most of water in the region is sweet with pumping depth of only at 15 to 40 feet and plenty of sunshine to harvest solar energy to propel famer needs and most important to develop a poor region which has been neglected in the past.

Country Presentations:

The workshop provided an opportunity to participants to present their country perspectives and share experiences in promoting water, energy and food nexus. A brief summary of the presentations made is given here below:-

Azerbaijan briefly reviewed the Food security state of the country being assessed acceptable as the level of self-sufficiency of main food products on an average higher than 70%. Only in case of wheat the level of self-sufficiency was 58.1% in 2017. However, it was identified that irrigation accounted to 73.02% of water consumption as the method was by flooding.
The main problems in water use are:

- Water canals are old;
- Share of ground canals is high;
- The main irrigation method is flooding which causes inefficient use of water resources;
- The main rivers of the country are polluted before entering the borders of the country;
- Climate changes (higher temperatures, floods, heavy rains etc.) cause big damages to agricultural production.

Egypt: In case of Egypt the issue of food losses need to be reduced to achieve food security by using means to preserve raw and food products in an innovative way to extend their shelf life, acceptable to the consumer and to preserve their quality and nutritional value. In order to do so, the application of good agricultural practices, rationalization and consumption of water as well as good manufacturing practices to produce a good product, safe and ensure food safety for the consumer, were being practiced.

Tajikistan: is a mountainous landlocked sovereign country with an estimated 9 million people in 2018. However, there are only limited reserves of oil and natural gas, and the country relies heavily on fuel imports. Tajikistan's water resources are derived mainly from glacial meltwater, frost and seasonal snow cover in the Pamir Mountains. They are used to support hydropower generation, irrigation, fishing and tourism as well as drinking water supply. The management of natural resources has been in a state of flux since independence in 1991, however in recent years the Government has become increasingly committed to reforms in the agriculture, water and other sectors. Tajikistan has negligible gas and oil resources, but has underexploited potential of hydroelectric energy, although full exploitation of this potential is constrained because the river basins in the country are subject to water apportionment treaties with other riparian countries. Except in large urban areas, electricity supply is intermittent especially in winter. Consequently, there is severe pressure on woodlands and forest to meet energy needs in rural areas.

Iran: as in some other Islamic countries, the energy and water sectors have different subsidies, so promoting or adopting green growth and technology policies in developing Food-Water and Energy Nexus is difficult with these subsidies. Iran is looking at the challenges and opportunities available in different Islamic countries (both institutional and informal) to provide practical solutions for implementing green growth. The widespread subsidies in the water and energy sector of Iran need to be rationalized to fully establish the natural comparative advantage of the country.

Kazakhstan: the case presented the FAO EBRD study on the adoption of climate technologies in the agri-food sector of Kazakhstan. The current state of agricultural GHG emissions and vulnerability of the agri-food sector to climate change and the results of a study were presented. It also revealed the adoption potential, the financial and economic feasibility of eleven climate technologies in crops, livestock sector, renewables energy in the agri-food sector of Kazakhstan.

Pakistan: Fatima Group from Pakistan highlighted the point that food security, water for agriculture and availability of energy are quite interlinked. It is not possible to have good agriculture product or food without having good quality, sufficient availability and accessibility of water on a large scale. In view of the scarcity of canal water, quality of underground water and the resources required to tap, there is a need to provide cheaper energy at large scale in order to mitigate the challenges faced. There is a need for innovative approaches like modern techniques to irrigate crops with less water, research and advocating for crops requiring low water and enhancing food production by introducing new seeds with less requirements of water. Attention is required to the climate change effects on agriculture, while there is drought like situations in some areas and flash or riverine flood hitting other parts.

Malaysia: Limitation of water resources has been rising concern in the face of growing population in urban areas of Malaysia. The pressing humanitarian importance of ensuring sustainable and universal access to clean water has led to private sector involvement to put the shrinking water resources to beneficial use to the fullest extent, and to prevent waste or unreasonable use. JZR Resources Sdn. Bhd. (JZR) has developed an IT-based solution that allows government and commercial water operators to sustainably manage their groundwater resources called Intelligent Management of Well (ImWell) System. This solution can effectively assist water operators to monitor, measure and manage on utilization of groundwater resources. Users will be able to remotely capture and act on consumption, diagnostic, and status data that would otherwise require a field visit to site. Throughout the water abstraction activity, the device will automatically report its availability and consumption measurements on to a cloud-based central database allowing real-time analysis for better decision-making process. Implementation is currently ongoing in the State of Selangor, Malaysia

Afghanistan: While landlocked Afghanistan is assessed to have sufficient water resources, however the country has faced water scarcity in recent decades. Afghanistan has the rights to take advantage of its water resources for its development without harming the environment and rights of riparian countries. Thirty percent of the population has access to energy. The Ministry of Energy and Water has developed a 5 years self-sufficiency plan. where over 90% of the

country's energy will be supported by Renewable Energy. On the other hand, agriculture is the main sector that provides food to the population. Agriculture has traditionally driven the Afghan economy, accounting for approximately 50 percent of GDP. Afghanistan met about 95% of its needs in wheat and rye, and more than met its needs in rice, potatoes, pulses, nuts, and seeds; it depended on imports only for sugar, and edible fats and oils. Fruit, both fresh and preserved (with bread), is a staple food for many Afghans. Agricultural production, however, is a fraction of its potential. Afghanistan agriculture exports are Safran, Ferula, Pine nut, Grapes, Insect Resin, different varieties of tropical fruits, dry nuts, etc. By cultivating the remaining 6% of arable lands, through energy and water management, Afghanistan has a strong potential to sustain its economy.

Palestine: The presentation described briefly the water situation in Palestine and the efforts made to restore water availability and accessibility for agricultural use. Given the increasing demands for water in competing sectors, the need for water use optimization and rationalization in irrigation was highlighted through the provision of applied interventions examples. The latter was emphasized through participatory approaches that involves water users' associations and stakeholders. This aims in particular to better manage and maintain irrigation infrastructure for more efficient use of water.

Recommendations:

After the presentations of papers and discussions, Mrs. Attiya Nawazish Ali, Assistant Secretary General, Islamic Chamber of Commerce, Industry & Agriculture (ICCIA) summarized the proceedings of the workshop and focused on the salient challenges their solutions and the way forward. Thereafter, after intensive discussions and exchange of views, the following recommendations were presented: -

A. Greening Technologies, Policies and Growth

Promoting climate resilient agriculture (CRA) is needed in OIC countries. Water, energy and food are inextricably linked to each other. But the problem is that all these three are affected by climate change. Adaptation to the changed climate is important for the short run whereas building resilience is necessary for the long run.

Paradoxical Agriculture is a comprehensive process based on natural processes of soil fertility and vegetation that provides solution to the above recommendation. Adaptation will solve all the problem faced by humanity i.e., soil degradation, water scarcity, food sovereignty, poverty alleviation and climate devastation. All these are interconnected and interdependent.

Economic Analysis presented at the workshop also show moving from conventional agriculture practices (entailing high cost of inputs and uncertain profits) to paradoxical agriculture (no purchased inputs and minimal water use) having the potential to meet three prone objectives-profitable and competitive agriculture, climate smart agriculture and inclusive agriculture. Promoting paradoxical agriculture is central to rationalize land, water and energy nexus. Efforts should be initiated for the conservation and sustainable use of biodiversity and genetic reserves. The OIC Countries need to support green technology projects to achieve sustainability and development goals and re-cycling of old equipment used in agriculture to ensure food supply and increasing the crops production. Solutions be prescribed based on those are practical and cost effective.

In practical terms decision makers need to identify an appropriate set of objectives and policies that incentivize farmers/ other stakeholders to invest in mitigation and adaptation strategies while maintaining steady productivity growth. These policies should make farmers internalize (incur by user) the social benefits and costs of their investments in climate change adaptation and mitigation.

An energy and water smart agriculture is important for economic growth under climate change. Groundwater pumping is one of largest energy user in agriculture, falling groundwater level in OIC countries are partly attributed to electricity subsidies. An evidence-based study for selected OIC countries is needed and recommended.

Sharing of best practices from other countries that are workable and can be adopted by the farmers in the five-domains of agricultural practices: productivity, environment, economic, social and human domain in promoting CSA practical.

Water is a precious natural resource; we need to work for increasing water use efficiency in agriculture using precision agriculture and technologies. Thus, OIC Countries need to adopt major sectoral reorganization of their production systems towards commodities where they have comparative advantages (economic, environmental and social), especially those that use green water.

B. Reducing Food Losses

OIC Countries need to better understand the levels of food losses and waste for the strategic commodities, understand the main factors affecting farmers, intermediaries and consumers decisions towards waste, and promote effective (cost effective) loss reduction activities in different points of the value chains.

Two themes -- promoting nature-based growth at farm levels and reducing food losses all along the national and global value chains be further explored with ICCIA and FAO support. This workshop has provided a strong base and knowledge to carry forward the proposed work as outlined below.

Shifting of synthetic fertilizer and pesticide to natural organic compost and biopesticide. The household waste from kitchen can be separately collected and processed as an organic natural compost as a sustainable practice. Global trade is driving force towards the Maximum Residue Limits (MRLs). (Acting as limiting factor for exports plus devalue the product) for pesticide residues and other contaminants.

C. Managing the Nexus

In the Food, Water, Energy Nexus, the ICCIA can engage and reach out to a number of OIC Institutions active in the Nexus, such as Islamic International Education, Cultural and Scientific Organization (ISESCO) based in Morocco, Ministerial Standing Committee on Scientific and Technical Cooperation (COMSTECH) based in Islamabad, Islamic Organization for Food Security (IOFS) based in Kazakhstan, the Inter-Islamic network on Water Resources based in Jordan.

Countries need to develop strategies to rationalize all water, food, agriculture, energy sectors without adversely affecting eco-system. To do this, policies of the three sectors must ensure synergies and conflicting policies should be avoided. The trust be on proper water accounting, productivity tradeoff, strengthen institutions to become reliable partners in water management for all water using sectors and rationalize water policy in agriculture due to climate change

Virtual water trade between water abundant OIC countries and water scarce countries, could help decreasing pressure of the nexus. Dividing water into green and blue, could help defining solutions.

We need to think out of the box, hence promote more cooperation and partnership to utilize shared resources among different nations. ICCIA, in close collaboration with technical partners like FAO, could guide and promote investment by the private sector to support policy making, as well as actual implementation of projects to support a green economy.

As water scarcity poses a serious challenge effect on human well-being, security and economic future of each country, the meeting highly recommends to increase of waste water service coverage, and to ensure the awareness among the citizens of the countries.

D. Enabling Environments

In order to secure a steady supply of energy for sustainable development with less harmful effects on the environmental economy, the ICCIA could guide collaborative planning for prioritization in a regional/cluster-based approach, supported by spatial planning. Agricultural and Industrial corridors should be developed with a market/demand-based outlook for optimal/effective resource allocation.

There is a need to promote at the national level policy coherence by ensuing synergies and tradeoff between water, food and energy sectors and address the policies, plans, strategies and action plans. Devise market for environmental goods and services. Pricing is essential and also incentivize quicker legislative action around the environment, stronger / better environmental laws.

While setting up Environmental Charges/Taxes (pricing/rate structures) as a policy to price for an environmental commodity (i.e. groundwater and surface water abstraction), introduction of embedded technologies to measure, monitor and manage (i.e. smart water meter, sensors) will need to be implemented in the first place.

E. Proposals to move forward

- Prepare policy papers (briefs) in identified areas from each region (Pakistan (Paradoxical Agriculture), Malaysia (Waste Water Treatment and nexus), Middle East (Morocco Green Plan) and Central Asia (Transboundary management of WEF Nexus) that could be the basis for conducting sub regional workshops leading to a regional workshop at OIC levels.
- There is a need to keep this momentum of cross learning across OIC Countries. Intensify ICCIA cooperation with FAO both at National and Regional Levels
- Need to tap IOFS to initiative some joint projects / research to further work on this Nexus.
- A multi-disciplinary team composed by different specialists from different areas of expertise to work together to solve agricultural issues and especially those related to WFE Nexus.
- Any monthly Newsletter / Periodical Bulletin could be a good idea to incorporate latest updates, innovative ideas, success stories etc.
- More frequent workshops of similar nature should be organized to study and discuss the various options and notions proposed by the speakers.

- Rotation of holding such Workshops in the Asia Pacific countries (perhaps Jakarta or Bali and other regions).
- Based on the overall state of the Water, Food and Energy Nexus, an ICCIA Policy be formulated for the OIC Countries be adopted in meeting the challenges.

Field Visit to SGS Pakistan:

The participants of the workshop visited SGS Pakistan Pvt Ltd. Karachi. SGS Pakistan was established in 1952. Today, SGS Pakistan has evolved into a dynamic team of specialists in the related disciplines of quality verification, supported by state-of-the-art testing laboratories and advanced technology. The participants visited a broad range of services to all sectors, including agricultural, mineral, environmental, oil, gas and chemical, and industrial, helping to mitigate risks, expedite workflow and assure quality standards. The visit was quite useful for complementing the deliberations of the workshop, especially in addressing issues of food losses and in improving competitiveness of these sectors.

Closing Session:

At the closing of the Workshop, Mrs. Attiya Nawazish Ali, Assistant Secretary General of the Islamic Chamber of Commerce, Industry & Agriculture (ICCIA) thanked all the participants, for their active participation and contributions to the deliberations of the Workshop. She also thanked the Perez-Guerrero Trust Fund for South-South Cooperation (PGTF), United Nations Development Program (UNDP) and the Food and Agriculture Organization of the United Nations (FAO), for their kind cooperation and support towards organizing this Workshop. She also thanked Dr. Jozimo Santos Rocha from Regional Office, Cairo and his staff for providing logistical, training and financial support in organizing this workshop.

At the end of the Workshop certificates were distributed among the participants and mementos were presented to the Resource Persons.

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Food and Agriculture Organization of the United Nations

Islamic Chamber of Commerce, Industry & Agriculture
La Chambre Islamique de Commerce, d'Industrie et d'Agriculture

The Perez-Guerrero Trust Fund for South-South Cooperation (PGTF)

Workshop on
Promoting Green Growth and Technology in Food-Water and Energy Nexus for OIC Countries – Challenges and Opportunities
December 2 - 4, 2019, Karachi, Pakistan

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