OFFICIAL FEEDBACK FORM

DIALOGUE DATE	Wednesday, 21 April 2021 10:00 GMT +05:00
DIALOGUE TITLE	Role of Water-Energy-Food Nexus for achieving food security in a changing climate for Pakistan
CONVENED BY	Dr Mohsin Hafeez, International Water Management Institute (IWMI)
DIALOGUE EVENT PAGE	https://summitdialogues.org/dialogue/9111/
DIALOGUE TYPE	Independent
GEOGRAPHICAL FOCUS	Pakistan

The outcomes from a Food Systems Summit Dialogue will be of use in developing the pathway to sustainable food systems within the locality in which they take place. They will be a valuable contribution to the national pathways and also of interest to the different workstreams preparing for the Summit: the Action Tracks, Scientific Groups and Champions as well as for other Dialogues.

1. PARTICIPATION

TOTAL NUMBER OF PARTICIPANTS

PARTICIPATION BY AGE RANGE

1	0-18	8	19-30	56	31-50	42	51-65	9	66-80		80+

PARTICIPATION BY GENDER

91	Male	25	Female	Prefer not to say or Other

NUMBER OF PARTICIPANTS IN EACH SECTOR

17	Agriculture/crops	14	Education		Health care
	Fish and aquaculture	1	Communication		Nutrition
1	Livestock		Food processing	11	National or local government
3	Agro-forestry		Food retail, markets	2	Utilities
34	Environment and ecology	1	Food industry		Industrial
	Trade and commerce		Financial Services	32	Other

NUMBER OF PARTICIPANTS FROM EACH STAKEHOLDER GROUP

	Small/medium enterprise/artisan		Workers and trade union
	Large national business		Member of Parliament
3	Multi-national corporation		Local authority
1	Small-scale farmer	30	Government and national institution
4	Medium-scale farmer	1	Regional economic community
1	Large-scale farmer	4	United Nations
4	Local Non-Governmental Organization	2	International financial institution
31	International Non-Governmental Organization		Private Foundation / Partnership / Alliance
2	Indigenous People		Consumer group
29	Science and academia	4	Other

2. PRINCIPLES OF ENGAGEMENT

HOW DID YOU ORGANIZE THE DIALOGUE SO THAT THE PRINCIPLES WERE INCORPORATED, REINFORCED AND ENHANCED?

To ensure that participants were respectful, rules of engagement were set at the beginning of the dialogue. In recognizing complexity, the dialogue focused on water's transformative role in food systems. The objective was to bring key outcomes of a national discussion on food and water systems in a changing climate to the global policy level and to provide tangible inputs into the UNFSS. To embrace multi-stakeholder inclusivity, the Pakistan dialogue was open to a wide range of stakeholders in the water, energy, food and related sectors ranging from intergovernmental organizations; regional, national and local government departments/entities, development partners; non-governmental organizations; the private sector, research for development organizations; academia; farmers' groups; and networks. Complementing the works of others, we introduced a plenary session comprising of global and national speakers who discussed the role of water-energy-food nexus in achieving food security transformation for Pakistan. The Dialogue was conducted under Chatham House Rules, where participants were free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, could be revealed. One of the principles had to be adapted: i.e. Commit to dialogue in the lead up to the Summit - the reason for this is that we had invited panelists who were especially critical of the UNFSS process, and through their institutions, have rejected being part of it, and have organized separate Food Systems Dialogues. We needed to allow participants to opt out of committing to the Summit itself, but asked them to commit to the dialogue and achieving food systems transformation in Pakistan in this process.

HOW DID YOUR DIALOGUE REFLECT SPECIFIC ASPECTS OF THE PRINCIPLES?

The Dialogue was organized with a focus on developing contributions to the FSS and elaborating pathways toward food systems transformation contributing to the 2030 Agenda for Sustainable Development Goals. The choice of focus on water security for food systems transformation very much addressed the lack of the direct attention to water within the UNFSS structure. The participation of multiple stakeholders was encouraged by bringing together a diverse group of actors in addition to those that typically engage in the area of water, food security, energy and climate change. The Dialogue invitation was sent to key stakeholders in research and academia, international donors, government agencies, farmers and private sector. The Feedback from the eight breakout groups discussions provided new insights from a wide range of stakeholders. Participants were five times engaged using Menti software during the dialogue. Breakout room discussion topics covered eight thematic areas that are highly important for food systems transformation in Pakistan, including both more technical and more policy-oriented topics. 1. Sustainable and renewable energy for food production 2. Climate Change impacts on water and food security 3. Policy coherence, implementation and institutional coordination in water, food, energy and climate change that operationalize the WEF nexus 4. Enhancing performance of water systems across multiple sectors (agriculture, domestic, industry and environment) demands 5. Advancing technical WEF models, tools and frameworks for decision making at multiple scales 6. Enhancing resilience and productivity of irrigated agriculture through the WEF Nexus 7. Community strategies to operationalise equitable WEF nexus approaches 8. Socio-Economic synergies and benefits of WEF Nexus

DO YOU HAVE ADVICE FOR OTHER DIALOGUE CONVENORS ABOUT APPRECIATING THE PRINCIPLES OF ENGAGEMENT?

We opted for a 'by invitation only' event conducted under Chatham House rules. While this contributed to establishing a safe space for all to discuss and engage freely, it also limited inclusivity to some extent. Next time, we may consider having an open invitation event and not restricting discussion to Chatham House rules. This would allow for great live social media reporting and post-event outreach. It is recommended to set the stage early on regarding the 'purpose' of the Dialogue by explaining the UNFSS' objectives and vision and action tracks, particularly for the benefit of the stakeholders who may be unfamiliar. This event was an Independent Dialogue with a national focus. Engaging participants' active audio-visual interventions by way of live polls (using Menti) and encouraging chat box discussions, actions or comments and questions increased participants' involvement.

3. METHOD

The outcomes of a Dialogue are influenced by the method that is used.

DID YOU USE THE SAME METHOD AS RECOMMENDED BY THE CONVENORS REFERENCE MANUAL?

✓ **Yes** **No**

4. DIALOGUE FOCUS & OUTCOMES

MAJOR FOCUS

Water security is imposing serious challenges for the social and economic development of Pakistan, listed as the 5th most climate-vulnerable country in the world. Extreme climatic variability (drought/floods) has highlighted the need to manage water resources more sustainably in Pakistan. Being an agrarian country of 220 million people, water resources play a vital role in serving a large population and sustaining the ecosystems. More than 90% of all withdrawals of the available freshwater resources of the Indus Basin are being used for the agriculture sector. Groundwater exploitation due to surface water scarcity, unsustainable irrigation and agricultural practices, and industrial effluents are affecting water quality and worsening the overall health of the basin and its ecosystems. The Indus is vulnerable to changes either due to climate change or due to transboundary conflicts at both national and inter-provincial levels.

Groundwater has played a major role in augmenting 60% of irrigation supplies through the privately-installed 1.5 million plus tube-wells for crop production in the basin. There is little credible scientific information available on groundwater monitoring, database development, regulation, environmental implications, and management. The situation gets more severe when tube-wells start tapping into brackish groundwater, accelerating the secondary salinization of irrigated soils, which damages crops and reduces yields. In this regard, groundwater demand management is still a big unknown. Conventional market approaches – of water rights and scarcity prices – are either too unwieldy or too unpopular to implement, while a 'command & control' approach has limited effectiveness and very high transaction (implementation) costs. Community-led groundwater management has also had limited success. That leaves us with the 'nexus approach' – using energy and food policies to shape pumping behaviour.

The Government of Pakistan has developed several national policies for various sectors including water, agriculture, energy, climate and environment. Presently, there is a lack of coherence between the developed national policies for water, food security, energy, and climate change which hinders implementation on the ground in Pakistan. The Water-Energy-Food (WEF) challenges highlight a wider array of issues surrounding smallholder resilience and the complexity of pressures being felt. The COVID-19 pandemic has highlighted with devastating effect how vulnerable many livelihoods are and how few assets poor farmers (and poor urban workers) have to fall back on. Climate change will exacerbate and multiply the potential impact of future shocks.

This regional dialogue therefore seeks to unpack the questions: how can food systems be localized for regional benefits including trade and transformed in a water-constrained Pakistan in a manner that acknowledges WEF nexus linkages?

The UN Food Systems Summit Pakistan dialogue highlighted eight key thematic areas on which participants were required to engage in an interactive manner that allowed for small group discussion, collective brainstorming, and agenda setting.

The thematic areas covered by breakout groups were: 1) Sustainable and renewable energy for food production; 2) Climate Change impacts on water and food security; 3) Policy coherence, implementation and institutional coordination in water, food, energy and climate change that operationalize the WEF nexus; 4) Enhancing performance of water systems across multiple sectors (agriculture, domestic, industry and environment) demands; 5) Advancing technical WEF models, tools and frameworks for decision making at multiple scales; 6) Enhancing resilience and productivity of productivity of irrigated agriculture through the WEF Nexus; 7) Community strategies to operationalise equitable WEF nexus approaches; and 8) Socio-Economic synergies and benefits of WEF Nexus.

Expected key outcome of this dialogue was getting involved and sharing the views of Pakistan stakeholders to better understand WEF nexus under a changing climate and guidance to develop a more climate-resilient water and land solutions in the Indus Basin.

ACTION TRACKS

✓	Action Track 1: Ensure access to safe and nutritious food for all
✓	Action Track 2: Shift to sustainable consumption patterns
✓	Action Track 3: Boost nature-positive production
✓	Action Track 4: Advance equitable livelihoods
✓	Action Track 5: Build resilience to vulnerabilities, shocks and stress

KEYWORDS

✓	Finance	✓	Policy
✓	Innovation	✓	Data & Evidence
	Human rights	✓	Governance
✓	Women & Youth Empowerment	✓	Trade-offs
		✓	Environment and Climate

MAIN FINDINGS

A holistic approach and reliable database on water resources and their use across Pakistan is the key to achieving food, water, and energy security in the fifth most climate-vulnerable country in the world, participants of the UN Food Systems Summit Independent Dialogue (Pakistan) have reported. The Dialogue highlighted the need for transformative approaches to promote equity and inclusion in water energy food (WEF) nexus governance for sustainable water, energy and food systems.

Other outcomes from the discussion was the need for a substantial increase in research and development funds for the agriculture sector through active dialogues with donors and development partners.

Dialogue participants emphasized improving policy coherence among key ministries through better inter-sectoral coordination and capacity building and raising awareness among researchers, policymakers, government officials, and farmers about the benefits of WEF nexus modelling approaches to optimise agriculture production in the Indus Basin.

Furthermore, the participants laid stress on the need for sizable interdisciplinary projects to realise true systems transformation and WEF nexus operationalization through pilot projects in the Indus Basin of Pakistan that hosts one of the world's largest contiguous irrigation networks.

The objective of the dialogue was to discuss how a shared vision for water, energy and food security could be achieved in a changing climate for Pakistan. Research shows that water security is posing serious challenges for the social and economic development of Pakistan, an agrarian country of 220 million people, amid the COVID-19 pandemic.

Around 100 participants from 12 countries had shared rich and diverse views on key bottlenecks in implementing the operationalization of WEF nexus in the context of Indus Basin. It was agreed that There is an urgent need for promoting inter-sectoral cooperation through evidence based information to ensure water-food-energy security and environmental sustainability for food system transformation in Pakistan.

The event provided an opportunity for in-depth dialogues to take place between diverse actors from across food systems, development partners, government, think tanks, universities, and international organisations.

The Pakistan dialogue highlighted eight key thematic areas around which participants engaged in group discussions;
1. Sustainable and renewable energy for food production
Key question: How can we sustainably produce more food in the region using low greenhouse gas energy sources?
2. Climate change impacts on water and food security
Key question: How can we sustainably enhance food security without compromising water security in the context of climate change?
3. Policy coherence, implementation and institutional coordination in water, food, energy and climate change that operationalize the WEF nexus
Key question: What practical steps can/should be taken to ensure policy coherence and institutional coordination to improve water, energy and food security in the region?
4. Enhancing performance of water systems across multiple sectors (agriculture, domestic, industry and environment) demands
Key question: How do we enhance resilience of water systems to meet the competing demands of multi-sectors (agriculture, domestic, industry and environment)?
5. Advancing technical WEF models, tools and frameworks for decision making at multiple scales
Key question: How can WEF nexus models/tools facilitate new understanding of interdependencies and trade-offs in the WEF nexus, as well as foster data sharing and enhanced decision-making in the region?
6. Enhancing resilience and productivity of irrigated agriculture through the WEF Nexus
Key question: How do we build more resilient food and livelihood systems while protecting critical water sources, biodiversity, and other ecosystem services while satisfying growing water demand?
7. Community strategies to operationalise equitable WEF nexus approaches
Key question: How can we promote equity and inclusion in WEF nexus governance to create opportunities for transformation towards more just and sustainable food, water and energy systems?
8. Socio-Economic synergies and benefits of WEF Nexus
Key question: What steps needs to be taken to assess the benefits and trade-offs across sectors, especially from a socio-economic point of view (employment, health, migration, equity, GDP, etc)?

Finally, the dialogue provided a knowledge platform to better understand WEF nexus under a changing climate and guidance to develop a more climate-resilient water and land solutions at multiple scales (farm, irrigation system, basin, country, and regional) in the IBIS. The outcome of this dialogue has provided a technical knowledge for proposing climate adaptation interventions at various scales leading to reduce water consumption from the agriculture sector in major areas of water basins such as the Indus.

ACTION TRACKS

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✓	Action Track 5: Build resilience to vulnerabilities, shocks and stress

KEYWORDS

	Finance	✓	Policy
✓	Innovation	✓	Data & Evidence
	Human rights	✓	Governance
✓	Women & Youth Empowerment	✓	Trade-offs
		✓	Environment and Climate

OUTCOMES FOR EACH DISCUSSION TOPIC - 1/8

Sustainable and renewable energy for food production
Key question: How can we sustainably produce more food in Pakistan using low greenhouse gas energy sources?
The group agreed that food production heavily relies on pumping groundwater using more than 1.5 million tubewells in the Indus Basin. These pumps are typically fueled either by diesel or kerosene, or they depend on subsidized electricity leading to high carbon emissions. The WEF nexus provides pathways to examine water, energy, and food security that are inextricably linked in the context of rapid population growth, growing multi-sectoral water demands, and sustainability challenges within and between countries. The session discussed the role of renewable energy sources in the agricultural sector as a means of enhancing sustainable food security, and explored existing technologies, policies, along with emerging opportunities in renewable energy application in the agricultural sector. Following recommendations were proposed;
a) Revisiting Agro-Ecological Zoning: The current agro-ecological zoning must be revisited in the context of the WEF nexus approach. Based on which we can map the surface water availability and designated areas for higher delta crops. Areas with less surface water availability would be supplementary irrigated with groundwater. Such areas should be designated for lower delta crops.
b) Groundwater governance: There is a need for introducing groundwater governance for estimation of quantity and quality for allowable extraction of water in areas of less surface water availability. Then work on system of incentives and disincentives for the introduction of renewable energy systems and high-efficiency irrigation systems.
c) Financial incentives: Incentives are pre-requisite for making possible substantial saving for energy use at the farm level particularly for groundwater pumping. There is also a need to replace the traditional primitive methods of water application with other efficient methods through better extension service. Thus financial incentives through proper policies and strategies should enable farmers to adapt the modern and renewable energy technologies in the farming systems. Such technologies, if adapted on larger scale, will tap the exploitation of groundwater sources like solar pumping system.
d) Incentives for small farmers: Policies must be modified so that they can provide incentives to the small farmers who are 70-80% of the farming community for using renewable energy for pumping.
e) Capacity building of farming community: 1.5 million farmers having tube wells must be educated for optimal pumping and efficient use of water. That is possible by activating our extension system.
f) Integrated energy plans: There is a need for the integration of diverse set up of energy generation resources with storage component to accommodate the productivity load of pumping units. Thus an integrated energy strategy may include energy production at different sources and requirements by different sectors, and finally the supply and gap analysis. We need new ideas like floating solar panels on water surfaces which can reduce water evaporation.
g) Bio-Waste Management for Renewable Energy Production: There is a need to convert that waste into energy. All the waste either going into the landfill, while the waste from the agriculture fields is being burnt causing smog. Proper and well-planned policies are required to harness the potential energy from bio-waste.
h) Improve efficiency practices in food production: Renewable energy utilization should be complemented with efficient water application. This must be followed by a proper value chain including reduced losses transportation, storage, etc.
i) Social Enterprise Mechanism for Sustainability: Social enterprise mechanisms must be a part of implementation frameworks of different policies and strategies to ensure timely and cheaper sustainability of the renewable energy systems used in the farming system.
There is a need to work on policy analysis, and evidence-based options for policy reforms, advocating private sector led growth strategies and building the capacity of stakeholders.

ACTION TRACKS

	Action Track 1: Ensure access to safe and nutritious food for all
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	Action Track 5: Build resilience to vulnerabilities, shocks and stress

KEYWORDS

✓	Finance	✓	Policy
✓	Innovation	✓	Data & Evidence
	Human rights	✓	Governance
✓	Women & Youth Empowerment		Trade-offs
		✓	Environment and Climate

OUTCOMES FOR EACH DISCUSSION TOPIC - 2/8

Climate change impacts on water and food security
Key question: How can we sustainably enhance food security without compromising water security in the context of climate change?
All participants of the discussion group were agreed that climate change through changes in temperature, rainfall patterns, frequent flooding, drought, and other extreme events is having an unprecedented impact on water and food security in Pakistan. Water scarcity, crop water requirements, and salinity have been increased on the account of climate change and all dimensions of food security- availability, access, utilization of food as well as stability of food systems have been compromised due to these increased risks of climate change. Because of these challenges, participants discussed that the following actions in the next 3 years will have the greatest impact on the discussion topic;
• Water security issue needs to be tacked through implementing water accounting and auditing system to re-assess sectoral water demands and needs
• Climate smart practices need to be identified and upscaled along with promoting innovative techniques for water saving among farmers
• Early Warning Systems and data sharing system need to be improved and provide sufficient early information to end-users to protect them and their livelihoods from negative impacts of extreme events such as floods, droughts, and extreme temperatures including heatwaves
• A central level project management system may be introduced at the federal level to avoid duplication of the projects and to keep track of all the projects being implemented in the water and agriculture sector
• Integrated support system for agriculture can be introduced with improved access to resources and services (advisory and credit) to enhance food productivity to meet growing needs
On the consumption side, there is a need to educate the public to diversify their diets and to reduce their dependence on a single major staple crop – wheat. In addition, the nutrition of the diet should also be considered.
All participants also discussed various potential contributions from organizations to make these actions sustainable and useful to sustain food and water security under changing climate. The possible contribution from different actors may include the following;
a) Federal and provincial governments and aligned departments:
• Develop sound policies for agriculture, water and environment keeping in view of the local needs in addressing food security in relation to changing climate
• Devise an effective and improved coordination mechanism for provincial and federal department to discuss ways to make our food systems more resilient
b) Development Cooperation/ International organizations:
• Support governments in identifying and upscaling innovative climate-smart solutions to make food systems resilient to climate change as well to make them able to meet the growing food demands
• Provide more support to the government to revise their policies and translate policy into action and enable them to have sound governance mechanism for implementation of relevant policies
c) Academia:
• More research on quantifying the impact of climate change on different dimensions of food security as well as water security
• Research on institutional mechanism and networking with a particular focus on climate change adaptation
d) Civil society/ communities:
• Civil society organizations need to use their influence to educate farmers in adopting adaptive measures that improve their resilience to climate change such as water saving, improved varieties, change in dietary patterns, use of nutritious diet.
• Communities need to participate in relevant capacity training being organized by various donors or government organizations to learn new ways of protecting their livelihood from extreme events.

ACTION TRACKS

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KEYWORDS

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		✓	Environment and Climate

OUTCOMES FOR EACH DISCUSSION TOPIC - 3/8

Policy coherence, implementation and institutional coordination in water, food, energy and climate change that operationalize the WEF nexus
Key question: What practical steps can/should be taken to ensure policy coherence and institutional coordination to improve water, energy and food security in the region?

Pakistan's agriculture is valued at US$50 billion and contributes to 20% of the GDP but uses 90% of the water and has the potential to generate US$350 billion with science-based management. Pakistan requires a vibrant agriculture system that addresses poverty and inequality, stemming from evidence-based policy making. To achieve significance on the discussion topic, it is imperative to work on the following areas
a) Reducing policy overlaps through institutional coordination. More than 18 agencies working in the water sector, hence overlapping of power—resulting in weak accountability of poor decisions. There is a National Water Policy (2018), while Punjab, KP, and Sindh have their policy. Measures are needed to bring about policy coherence and coordination. The federal government and provincial governments should work within boundaries as per the constitution and be brought under the umbrella of an agency that can be held responsible for overall food systems and agriculture. Bring together IPPs and farmers on board for policymaking. Much headway has been made by various departments, but there is still a lack of political will and mechanism to bring the different projects in the water, food, and energy sector under one umbrella.
b) Federalism and lack of clear authority. Pakistan has a hybrid system. Post-18th amendment the perception is that WEF is a provincial subject, however, the federal government has the final say, for instance, in setting subsidies. There is a need to outline a clear mandate if WEF is a national concern. Federal and provincial governments must spell out what is the priority they accord to Food Systems Security with support from the highest level of government and governance.
c) Pakistan's crops have become political crops. Decisions are based on political will and not on scientific research or macro-economic priorities. Incorporating political economy in research and policy discussion is essential for highlighting the negative consequences of political decisions.
d) Equity in water is essential. Tailenders crops also have the right to adequate water to protect their welfare. Disseminating the data regarding the transition in dietary habits of households can have a significant impact on policymaking. The recent shift in households' consumption pattern from an unhealthy diet to a more nutritious diet can be taken as a guide to shift from water thirsty crops to Water thrifty crops.
e) Water has to be taken as a commodity otherwise savings in water may not be possible. Revisiting the subsidies in the water sector is critical. Work is required on mapping and modeling water subsidies and creating space for sustainable agriculture by measuring the costs and benefits attached to each subsidy. Likewise, distortions created by such programs must become transparent.
f) Crops driven by technology: Technology based remote sensor monitoring and water modeling on cropping patterns and pricing may yield great benefits. The focus should be on exploiting technology and statistical modeling for forecasting production, pricing and consumption. Ways should be explored to make the existing agriculture system more productive.
g) Land fragmentation needs to be addressed. As per the 2010 agriculture census, almost 85-90 percent of the land farm size is less than 5 hectares. Linkage of small farmers with multinational and agricultural value-chains, such as through contract farming, needs to be promoted to combat land fragmentation. Moreover, protecting agricultural land that is being taken over by housing societies should be discouraged. Agro-ecological zone-based policy recommendations should feature high on the policy agenda.
h) Smuggling of staple crops and misappropriation needs to be tackled. Rampant and unchecked smuggling of agricultural produce out of Pakistan threatens food security in the country.

ACTION TRACKS

	Action Track 1: Ensure access to safe and nutritious food for all
✓	Action Track 2: Shift to sustainable consumption patterns
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✓	Action Track 4: Advance equitable livelihoods
✓	Action Track 5: Build resilience to vulnerabilities, shocks and stress

KEYWORDS

✓	Finance	✓	Policy
✓	Innovation	✓	Data & Evidence
	Human rights	✓	Governance
	Women & Youth Empowerment	✓	Trade-offs
		✓	Environment and Climate

OUTCOMES FOR EACH DISCUSSION TOPIC - 4/8

Enhancing performance of water systems across multiple sectors (agriculture, domestic, industry and environment) demands
Key question: How do we enhance resilience of water systems to meet the competing demands of multi-sectors (agriculture, domestic, industry and environment)?

All participants agreed that the following important actions needs to implemented in true letter and spirit during the next three years:
• Implementation of Integrated Water Resources Management approach to meet increasing demand and competition among various sectors and users
• Development of water accounting system for the sectors and improvement of these databases according to water use and disposal
• Determining the value of water for each sector and appropriate pricing for all sectors according to the uses
• Investment in drinking water supply systems with proper pricing
• Treatment, recycling, and reuse of wastewater using the decentralized approach thus protecting vital ecosystem
• Use of non-conventional water resources such as wastewater, saline water, rainwater

The institutions can help develop water accounting for all the sectors, can provide solutions – simple to complex issues and can provide science based evidence for addressing those issues through conducting adoptive research. They can also help build the capacity of the policy makers, planners, and practitioners to adopt technically feasible, economically viable and environmentally sustainable technologies/practices. They can also help developing policies and regulations for better governance of water resources. Through knowledge sharing, they can develop consensus and trust building among various stakeholders.

The following outcomes will help decide about the success of the proposed actions:
• Comprehensive national water accounting is available
• Sectoral database is developed with open data sharing policies among various sectors
• The process of integrated water resources management has been initiated
• Financial sustainability of irrigation system is achieved
• Safely managed drinking water supplies are improved
• Wastewater is treated at the sources before disposal
• Groundwater recharge zones are developed and artificial groundwater recharge technologies are practiced.
• The quality of water resources for eco-systems is improved.

ACTION TRACKS

	Action Track 1: Ensure access to safe and nutritious food for all
✓	Action Track 2: Shift to sustainable consumption patterns
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	Action Track 4: Advance equitable livelihoods
✓	Action Track 5: Build resilience to vulnerabilities, shocks and stress

KEYWORDS

✓	Finance	✓	Policy
✓	Innovation	✓	Data & Evidence
	Human rights	✓	Governance
	Women & Youth Empowerment		Trade-offs
		✓	Environment and Climate

OUTCOMES FOR EACH DISCUSSION TOPIC - 5/8

Advancing technical WEF models, tools and frameworks for decision making at multiple scales
Key question: How can WEF nexus models/tools facilitate new understanding of interdependencies and trade-offs in the WEF nexus, as well as foster data sharing and enhanced decision-making in the region?
All participants agreed on the following action points.
a) There is a need for a comprehensive review of the state of the art in WEF modelling, which seems to be sparse and partial given our discussions. Although there are models on water, energy, and food subjects (economic models, hydrological models, crop models, etc.), they are disciplinary and do not provide adequate, integrated insights and solutions. Hence, fully integrated WEF models are needed for synergy and trade-off analyses, and to assess water-energy-food interdependencies in an integrated way. Currently, many organizations are working on developing multidisciplinary models with a system approach. However, WEF models are still too often academic exercises and, therefore, the implementation of WEF models for policy and investment purposes is limited.
b) The discussants suggested that the focus in the coming years should be on tying research organizations together to reach across silos in research as well as government organizations. For example, IFPRI and IWMI collaboration in partnership with local/national partners can help to foster the collaboration of departments of agriculture and irrigation. The discussants raised this point because WEF is a nexus approach, whereas most organizations in Pakistan are working in silos that are often built around individual disciplines. International research institutions can organize dialogues across all stakeholders, arrange awareness campaigns on WEF models, and organize training sessions to showcase the importance of working in an integrated way.
c) The discussants agreed that there should be a focus in coming years on selected examples, like solar tubewells, which provide a connection between hydropower, irrigation and even food security in the Indus basin. Examples such as solar tubewells will demonstrate the value of more comprehensive WEF models. Some discussants were of the view that solar irrigation can result in overexploitation of groundwater aquifers and hence question the sustainability of groundwater use, whereas other discussants thought that such issues will provide an opportunity to integrate different institutes to address sustainable use of resources.
The group concluded that our institutions could engage in developing WEF models further and can assist in designing protocols for data collection and management (including sharing of data) It will not be enough however just to develop models and protocols, but the capacity enhancement and policy dialogues will be equally important activities that our organizations can take on. For example, building the capacity of local academic and research institutes to work with WEF models, so that they can understand and implement them, will add to the sustainability of these efforts. To successfully achieve this capacity enhancement, ongoing stakeholder and policy dialogues on the usefulness of WEF models as applied to critical issues in the country are needed. As this process proceeds, our organizations can assist in identifying barriers to legal and governance issues that limit the implementation of WEF models.
Finally, this session identified the silos that exist and limit the usefulness of WEF models at present, so our organizations need to work together to maximize the impacts of outputs derived from modeling and data management exercises. Thus, coordination on the international research side is also required.

ACTION TRACKS

✓	Action Track 1: Ensure access to safe and nutritious food for all
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✓	Action Track 5: Build resilience to vulnerabilities, shocks and stress

KEYWORDS

✓	Finance	✓	Policy
✓	Innovation	✓	Data & Evidence
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	Women & Youth Empowerment	✓	Trade-offs
		✓	Environment and Climate

OUTCOMES FOR EACH DISCUSSION TOPIC - 6/8

Enhancing resilience and productivity of irrigated agriculture through the WEF Nexus
Key question: How do we build more resilient food and livelihood systems while protecting critical water sources, biodiversity, and other ecosystem services while satisfying growing water demand?

There are tradeoffs between the use of water and the use of energy for agriculture and other purposes. It is important to bring in biodiversity and ecosystem in this challenge and try to improve the resilience of productivity of irrigated agriculture through water energy and food Nexus. It is significant to understand the impact of climate change on the availability of water and food production while addressing food security in irrigated agriculture. Climate change in Pakistan especially in the Indus basin is bringing erratic rainfall patterns. Climate change is shifting the water availability, for instance, unprecedented rainfall, increase in temperature is changing crop water requirement, that affects crop maturity, crop growing is shortening, often monsoon starting earlier or later, etc. There is a lot of uncertainty in terms of water availability in terms of temperature increase during day and night and for both Rabi and Kharif seasons. Therefore, we need to increase the productivity of irrigated agriculture by effectively utilizing the land and water resources while ensuring that alternative energy sources are not being misused.
The Government of Pakistan is promoting solar power and extraction of water from the ground but there is a need to do some research and determine how this would increase productivity and improve the food systems. There is a role of solar panels and solar electricity that is not only beneficial in pumping out the groundwater but also have a significant role in pumping out saline water which is particularly used in Sindh with scarp tubewells. Probably there are ways to put control how much water can be extracted from freshwater areas. Around 1.5 million tubewells are operational in Pakistan yet there is no data on the extraction of water and stress water zones. A better approach would be to set and identify the stress groundwater zones, and allocation of each zona needs to be agreed upon with the community and relevant stakeholders so that the people are aware of the fact the water level is depleting. Community-based engagement of stakeholders in managing aquifers and groundwater is extremely important to address the availability of water issues for productive agriculture.
Moreover, a systematic approach is needed with much more information for balancing tradeoffs. While making a decision, consider a link between managing the canal and groundwater, and determine the impacts and implications of canal risk management. Canal management is an intervention tool, for recharging groundwater.
Conservative water management is important that is already happening in Pakistan however, there is a need to further improve the traditional water management to adopt a water balancing system approach and to understand the availability of resources to be used efficiently.
In summary, a systematic approach is required to improve productivity by integrating packages that include pumping, storage, efficient irrigation systems, tools, technologies/techniques/practices, etc. to increase productivity–isolated solution does not work sustainably.
There is also a need to realize limits- the system is already touching limits against the growing demands - need to prioritize science and technology. Tools and models shall not be used only for decision-making but also to encourage discussion with stakeholders through effective participation. It could be a difficult process, but to tackle the complex problems difficult solutions need to be proposed. Existing systems need to be updated and parallel to that introduce the latest technologies. Also within irrigated agriculture, water counting and water balancing are required, to identify hotspots of water productivity, and do more analysis of why water productivity for some crops in one area is more than others that will help in addressing the issues.

ACTION TRACKS

	Action Track 1: Ensure access to safe and nutritious food for all
	Action Track 2: Shift to sustainable consumption patterns
✓	Action Track 3: Boost nature-positive production
✓	Action Track 4: Advance equitable livelihoods
✓	Action Track 5: Build resilience to vulnerabilities, shocks and stress

KEYWORDS

	Finance	✓	Policy
✓	Innovation	✓	Data & Evidence
	Human rights	✓	Governance
	Women & Youth Empowerment		Trade-offs
		✓	Environment and Climate

OUTCOMES FOR EACH DISCUSSION TOPIC - 7/8

Community strategies to operationalise equitable WEF nexus approaches
Key question: How can we promote equity and inclusion in WEF nexus governance to create opportunities for transformation towards more just and sustainable food, water and energy systems?
Various strategies adopted at community levels can be scaled up to promote inclusivity and equitability in the WEF nexus. Some small-scale programs can be expanded to achieve the desired results. For instance, a project in Punjab that aimed to develop the capacity of women involved in rice production by including them in every step of the crop's value chain can be implemented at the national level to increase the representation of women in the market value chains. Enterprises can be established to develop the capacity of women in pre-and post-harvest activities. Moreover, market infrastructures can be developed to support the increased participation of women in the value chains. Female extension agents can be employed to increase access of female producers to technology and market information.
Another project that equipped female agricultural producers with high-efficiency irrigation systems (HIES) successfully increased their crop yields and encouraged the adoption of more efficient technologies. However, the success of this project was not sustainable due to constraints such as lack of resources/capital and inadequate support from families and government institutions. Thus, to ensure the success of such a project on a larger scale, an expansion in credit facilities for women and other minority groups and implementation of policies that promote the adoption of innovative technologies among the marginalized groups are needed.
Employing ICT is a recommended approach to increasing equitability in the WEF nexus. Barriers such as mobility constraints, lack of access to information and technologies, lack of credit services can be addressed by using ICT tools in disseminating information, increasing communications, and providing credit and technical support.
Increasing the participation of women and other minority groups in political bodies can increase their representation in decision-making processes and can ultimately include their perspectives in the WEF nexus. However, several challenges exist in increasing the participation of marginalized communities in decision-making roles. Reforms need to be introduced to eliminate structural and institutional barriers that prevent the participation of these groups in decision-making bodies. Moreover, awareness and educational campaigns need to address the gender stereotypes that are deeply rooted in our societies.
In conclusion, a bottom-down approach needs to be adopted to include the perspectives of groups ignored in the WEF nexus. However, success can only be achieved when such measures are accompanied by policies and reforms that address the existing challenges that marginalized communities face in accessing equal economic, social, and political opportunities. Several steps need to be taken by public and private institutions to increase inclusivity in the WEF nexus. Firstly, a lot of government projects such as social safety net programs target larger farmers. . The government institutions need to partner with NGOs and other organizations working with underrepresented communities such as women, small farmers, and other marginalized groups, to design interventions specifically for these population groups. Secondly, the national and provincial policies developed are often generic and not inclusive. Moreover, a top to bottom approach is adopted in the implementation processes which ignores representation from such marginalized groups. The government needs to work with research institutions and organizations working in the field to help them design policies that address the key challenges faced by various groups. The policy formulation process needs to be made more demand-driven, in that key stakeholders should be involved in the formulation of policies, to ensure that the issues of all the relevant stakeholders are addressed. Thirdly, the private sector can be involved to promote equitability in the WEF nexus.

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KEYWORDS

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OUTCOMES FOR EACH DISCUSSION TOPIC - 8/8

Socio-Economic synergies and benefits of WEF Nexus
Key question: What steps needs to be taken to assess the benefits and trade-offs across sectors, especially from a socio-economic point of view (employment, health, migration, equity, GDP, etc)?
a) Population: Pakistan has a population growth of 2.9%, three years back demand of wheat was 25 million tonnes whereas now it is 29 M-t. Agricultural land area is shrinking, cropping intensity has increased but still, it is low as compared to other countries in the region. Increased cropping intensity has resulted in the deterioration of soil health. The problem of population growth needs to be analysed from the demand and supply sides. On the demand side, a large population will need more water and more food. On the supply side, in Pakistan food is exported and imported at the same time. Before 2013 Pakistan was a net exporter of food now it is a net importer. Some necessary foods are now being imported which were produced within the country in the past. At the macro scale, it is important to keep food and water balance. To address the challenge of population growth, we need to take on board religious leadership.
b) Migration: Scarcity of water leads to migration. For example, in rural areas of Baluchistan Karezes have dried and people are unable to grow their food. Scarcity of water also leads to loss of livelihoods. Some families in rural areas have installed solar irrigation pumps but it solves the problem to only some extent. Though installation of tube wells has helped with agriculture, it has resulted in the lowering of the groundwater table. This has led to migration from water stressed areas.
c) Urbanization: Due to unemployment in the rural areas, people are migrating to cities and cities have been expanding. Thus, causing food and income insecurity. Migration to urban centers can be both voluntary and involuntary. Voluntary migration to cities takes place in search of better livelihood. Involuntary migration to cities can take place as a result of climate change events like drought and flood. In any case migration to cities gives rise to challenges of overcrowding, water scarcity, and solid waste management.
d) Alternative Energy: The cost of lifting water for more than 130 meters is huge, there is a dire need to make sure that energy requirements should be met. Energy security can be achieved through the promotion of renewable energy. Rising energy demand in wake of population growth can be met by the government through subsidizing solar energy for farmers. At the same time abandoning electricity as an alternative source of energy to solar energy should be made mandatory by the government for farmers adopting solar energy. Focus on renewable energy should be prioritized through favorable legislation and required support for the farmers.
e) Water Resource Development:
Investments should be made in water resource development. Previously, water issues were managed through the community. Now the community has been disrupted by migration. Water harvesting can be used to improve water availability and reduce water wastage. Vulnerable water stressed areas should be targeted at the watershed level, watershed management should be focused through the use of remote sensing.
f) Value Chain Development: Value added agriculture should be focused to improve the GDP contribution of the agriculture sector. Industrialization for value chain development should be done in rural areas to stop migration from rural areas.
g) Water Storage: Along with water efficiency, we need to improve water storage by building small and large dams. Increased water storage capacity will lead to an increase in water availability which will result in food security and livelihood opportunities.
h) Investment in Agriculture Sector: Pakistan's investment in the agriculture sector is the lowest in this region. R&D can focus on energy efficient crop varieties and the use of renewable energy.
Institutions working in silos is one major barrier in addressing above mentioned challenges effectively through research. For research to bear fruits practically institutions need to effectively cooperate and collaborate

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KEYWORDS

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AREAS OF DIVERGENCE

During the discussion subject of "Sustainable and renewable energy for food production", the participant had no significant divergent, only caveat water to manage groundwater before we move to solar pumps.
Participants identified the following divergences during the discussion subject of "Climate change impacts on water and food security".
• Inefficient and disparity in water pricing system make it difficult for Pakistan to sustainably manage its irrigation system. There is a serious need to revise water pricing and to have a groundwater policy to address the issue of acute water shortage and manage the water needs of all sectors including water for the environment.
• Poverty and limited access to resources often coupled with small landholdings is another big challenge identified in the discussion. For this purpose, improved access to resources along with a well-established support system to support climate-smart agriculture for enhanced food and nutrition security in Pakistan.
• Lack of coordination or limited coordination between different departments at the provincial and federal level is another major divergence in sustaining food and water security under changing climate revealed in the discussion. In order to improve coordination, a multi-stakeholder approach may be adopted giving fair chance to all stakeholders to present their point of view and make a consensus to make agriculture resilient.
• High use of water for irrigation agriculture has become a major issue challenging the sustainability of water systems as well as food security in Pakistan. Farmers need to be educated for improved and cost-effective solutions to enhance water and land productivity and enhance their resilience to climate change.

The group which discussed Policy coherence, implementation and institutional coordination in water, food, energy and climate change that operationalize the WEF nexus: Contrary to the common belief, rapid urbanization and mushroom growth in housing societies are one of the most serious threats to the water, energy, and food nexus. Housing societies are not only encroaching the arable lands but are also having adverse effects on water utilization. Ring-fencing the agricultural land to save it from urbanization is a critical step for ensuring sustainable agriculture and water.
A group that discussed the topic Enhancing the performance of water systems across multiple sectors highlighted that the systems are faced with the issues of poor revenue collection ultimately leading to the unsustainability of the institutions. One way to manage these gaps is to think about reallocation of water according to the “willingness to pay principle”. The use of secondary treated wastewater in agriculture may be a potential option to reduce stress on the groundwater. Similarly, the saline water/drainage effluent offers a great potential to reduce the gap between water demand and supply. Developing a database is essential. However, it would never be enough. Therefore, there is a need to manage water systems with certain uncertainties. Likewise, complex technologies may provide solutions to management problems at a large scale but the importance of simple technologies cannot be ignored for small scale and community run operations. While considering the value of water there is a need to prioritize according to its use. If the value of water is estimated properly, the environment would underpin all other sectors. There is a need to explore other solutions such as the promotion of recreational activities and eco-friendly tourism on the properties of irrigation systems.
The group which discussed topic advancing technical WEF models, tools and framework for decision making at multiple scales had different viewpoints about how important pursuing WEF models would be. Some discussants felt that in many instances current hydrological or economic models would be sufficient to address most issues. Moreover, the broader WEF models have not yet really led to impacts on very many topics, so the need to demonstrate the power of WEF models was not always seen uniformly by members of the discussion. While less discussion addressed potential benefits, it seemed that using only narrow, discipline-based research approaches, solutions to the complex problems posed in water, energy, and food security topics could often be missed. These possibilities can best be understood using WEF models in comparison to more traditional single-discipline approaches.
Community group discussion: Marginalized groups, primarily women are often ignored in the WEF nexus due to its top-down approach. Women and other minority groups are usually left out from the decision-making processes at the community/provincial/national level. While at the household level, women are responsible for managing food, energy and the water supply, their representation on decision-making bodies such as the village council is very limited. The deeply ingrained patriarchal social norms act as barriers for women and other groups to participate in the bureaucratic system that is responsible for making decisions related to the WEF nexus. This fact is verified from the low levels of representation of women and other minority groups on political bodies. The inadequate representation of these groups on such forums limits their ability to effectively voice their concerns, and thus, they are neglected in the management of the WEF nexus actions.

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ATTACHMENTS AND RELEVANT LINKS

ATTACHMENTS

- **UNFSS Pakistan Dialogue Participants response**
  https://summitdialogues.org/wp-content/uploads/2021/06/UNFSS-Pakistan-New.pdf
- **UNFSS Pakistan Dialogue Concept Note**
  https://summitdialogues.org/wp-content/uploads/2021/06/UNFSS-Pakistan-Independent-Dialogue-Concept-Note-20210418.pdf
- **UNFSS Pakistan Independent Dialogue Invitation**
  https://summitdialogues.org/wp-content/uploads/2021/06/UNFSS-Pakistan-Independent-Dialogue-Invitation-20210414.pdf
- **Participants Picture 1**
  https://summitdialogues.org/wp-content/uploads/2021/06/1-1.jpg
- **Participants Picture 2**
  https://summitdialogues.org/wp-content/uploads/2021/06/2.jpg
- **Participants Picture 3**
  https://summitdialogues.org/wp-content/uploads/2021/06/3.jpg
- **Participants Picture 4**
  https://summitdialogues.org/wp-content/uploads/2021/06/4.jpg

RELEVANT LINKS

- **Event notification page**
  https://summitdialogues.org/dialogue/9111/
- **Event notification page**
  https://wle.cgiar.org/event/unfss-independent-dialogue-pakistan
- **Post-event press statement**
  https://www.iwmi.cgiar.org/2021/04/data-funds-and-dialogue-key-to-water-energy-and-food-security-in-a-changing-climate-for-pakistan/
- **Daily The Nation Newspaper**
  https://nation.com.pk/25-Apr-2021/panellists-on-iwmi-dialogue-discuss-how-pakistan-can-achieve-food-water-and-food-security
- **Dawn Newspaper**
  https://www.dawn.com/news/1620425/ways-discussed-to-achieve-water-energy-and-food-security
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  https://www.pakistantoday.com.pk/2021/04/25/panel-discusses-ways-to-achieve-food-water-and-energy-security/
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