Please note that this request was initially made by the country under the Adaptation Fund Climate Innovation Accelerator (AFCIA) programme, using a template for the application (technology concept) of AFCIA. As the implementation of technical assistance under AFCIA was limited, the request was not selected; however, in discussion with the country, it was agreed in principal that the request can be implemented using CTCN resources. Hence, a reference number for the CTCN TA request is generated with the AFCIA application attached here. As soon as the signed request in CTCN TA request template is received from the country, this document (AFCIA application) will be replaced by the same. Please see the AFCIA Technology Concept from the next page onwards.

Technology concept submission form

Guidelines:

- Technology concept submission form should be completed by an applicant organisation in collaboration with the national focal points to the CTCN (National Designated Entity, NDE) and the Adaptation Fund (Designated Authority) of the country. Please see updated contact list of the NDEs and the Designated Authorities through web-links as below:
  - NDE: http://unfccc.int/ttclear/support/national-designated-entity.html
  - Designated Authority: https://www.adaptation-fund.org/apply-funding/designated-authorities/
- The form must be signed by the NDE before official submission to UNEP-CTCN.
- The form can be submitted as a Word file containing a digital signature or as a signed and scanned PDF file in combination with an un-signed Word file.
- For the technology concept submitted by multiple countries, all the NDEs of the respective countries shall sign identical forms before official submission to UNEP-CTCN.

Country or countries:	Islamic Republic of Pakistan
Title of the technology concept:	Improving adaptive capacities of water sector through surface rain water harvesting technology adoption
NDE:	Mr. Muhammad Irfan Tariq **Director General (Environment)** **Ministry of Climate Change, Government of Pakistan** LG&RD Complex, G-5/2, Islamabad, Pakistan Tel: +92-51-9245528 Fax: +92-51-9245533 Email: mirfantariq@gmail.com
Applicant:	*Please add name of the organisation, name of the contact person, position, email and address of the organisation.* *Mr. Faizan Ul Hasan* *Project Manager - Water Recharge* *PCRWR-Ministry of Science & Technology* *faizan_ul_hasan@hotmail.com*

Geographical scope:
☒ Community level
☒ Sub-national
☐ National
☐ Multi-country

If the technology concept is at a sub-national or multi-country level, please describe specific geographical areas (provinces, states, countries, regions, etc.).

Khyber Pakhtunkhwa (KPK), Punjab (Urban Areas), Islamic Republic of Pakistan

Problem statement related to climate change (up to one page):

This section should answer the question "what is the problem?" Please summarise the problem related to climate change and/or the negative impacts of climate change in the country that the technology concept aims to address.

Water crisis is one of the most pressing issues that Pakistan faces at the moment. According to World Research Institute's Adequate Water Risk Atlas, Pakistan ranked fourteenth among countries facing extremely high-water stress. In 2018, the Pakistan Council of Research in Water Resources (PCRWR) announced that by 2025, there will be very little or no clean water available in the country. When look at the impacts of climate change and how one can adapt, the most vulnerable are the girls, young women and the children. Countries facing extremely high-water stress are using up to 80% of the available surface and ground water supply in an average year, and even small dry shocks, which are poised to increase due to climate change, can have sever effects, according to WRI.

Water resources are inextricably linked with climate; this is why the projected climate change has such serious implications for Pakistan's water resources and negatively affecting people mainly girls and young women, agriculture, ecology, and local biodiversity. The impact will very likely not be uniform in the country, but mainly defined by variations in demographics, precipitation patterns, temperature variations, agricultural practices and the nature and sustainability of fresh water sources. Freshwater resources in Pakistan are based on snow and glacier-melt and monsoon rains, both highly sensitive to climate change.

The existing water resources in Pakistan are under substantial stress due to rapidly growing population size, fast rate of urbanization and subsequent unplanned land use changes. The per capita surface water availability stood at 1,036 cubic meters per year (m3 /year) in 2012 and is estimated to drop to about 860 m3 by year 2025 representing acute water shortage condition (WAPDA, 2014). Pakistan has the world's fourth highest rate of water use. Its water intensity rate - the amount of water, in cubic meters, used per unit of GDP - is the world's highest. This suggests that no country's economy is more water-intensive than Pakistan's. According to the International Monetary Fund (IMF) in 2015, per capita annual water availability is 1,017 cubic meters - perilously close to the scarcity threshold of 1,000 cubic meters. Back in 2009, Pakistan's water availability was about 1,500 cubic meters.

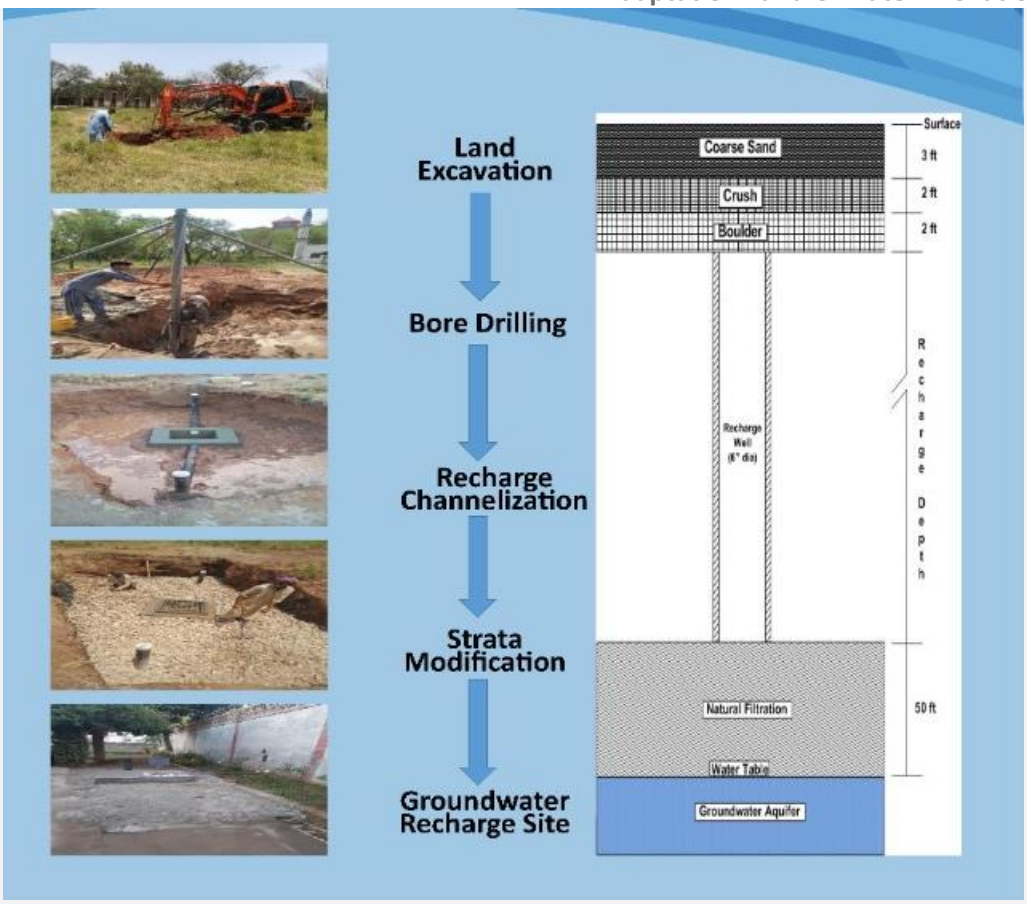
If problem of water shortage prevails, it might have drastic and long-ranging socio-economic, environmental, effects and can adversely impact the most vulnerable communities including girls, young women and the children and the community at large.

Past and on-going efforts to address the problem (up to half a page):

This section should answer the question "what has been done or is currently being done to address the problem?" Please describe past and on-going processes, projects or initiatives implemented in the country or region to tackle the climate problem as described above.

In many water-stressed areas, small and medium scale rainwater harvesting (runoff collection) infrastructure can contribute greatly to the availability of freshwater for human consumption. This is particularly true in arid and semi-arid regions where the little rainfall received is usually very intense and often seasonal (Elliot et al., 2011). Pakistan has the world's largest indigenous rainwater harvesting system commonly called as the spate irrigation system. The system irrigates around 0.3 million hectare (mha) of cultivated land in the country while the potential area to bring under this system is estimated to be around 6.935 mha (Ahmed and Steenbergen, 2010). The system thrives on flood water generated from hill-torrents which is diverted to the command area through natural, earthen, and weir-regulated structures. In some areas of Pakistan, where the spate irrigation system is technically advanced, the high flow of floodwater is regulated through diverting it to water storage tanks through well-established system of canal networks. The stored water is distributed out to the water users operating inside the command area as per agreed water entitlements between the government and water-use association. Although this technique of rainwater harvesting is old and practiced by community, it lacks quality and sustainability. Most of the community owned storm water harvesting ponds suffer from poor designs and vulnerability to contamination from the ambient environment. While executing a human security project in 2015 at D.I.Khan.

Rainwater harvesting for artificial groundwater recharge and flood control in urban areas can be utilised for reducing ground water resources. This technique involves construction of an inverted well by boring a vertical perforated pipe up to groundwater table. This inverted well is also stocked up with filtration media; boulder, crush and sand. Runoff water is channelled to this inverted well to recharge groundwater. This technique is considered for curtailing urban flood and stored this excess flow in to groundwater for later use. Therefore, this technique will not only offers an opportunity for urban flood management but also drought resilience particularly in areas dependent upon rainwater.



A schematic diagram of the construction of an inverted well

Government of Pakistan, had carried out The Technology Need Assessment (TNA) for Climate Change Adaptation process. The TNA report focuses on various aspects of adaptation technology identification and prioritization for the two most climate change vulnerable sectors of the country. The report quickly reviews the required institutional structure for TNA in Pakistan, discusses briefly the past trends and future projections for changing climate, links it up with identification of climate vulnerable sectors of the country in the light of national development goals and type of climate risks and finishes off the report with identification and prioritization of sector-specific technologies by using multi criteria decision analysis tool.

Specific technology[1] barriers (up to one page):

This section should answer the questions "what are the technology barriers that hinder national efforts described above" and "how will the technology concept complement these efforts?" Building upon the problem statement and taking into consideration the existing efforts described above, please describe the specific technology barriers encountered by the applicant to identify, assess or deploy climate technology(ies) in an effort to address the problem statement. The described barriers should be within the scope of the technology concept (described in the section below).

[1] *"**any equipment, techniques, practical knowledge and skills** needed for reducing greenhouse gas emissions and adapting to climate change" (Special Report on Technology Transfer, IPCC, 2000)*

The surface rainwater harvesting technology can be categorized as a non-market public good when established at a community level and requires state level support to develop and manage the system. The technology option in this report is community or State-managed surface rainwater harvesting system and thus considered as a non-market public good. Rainwater harvesting for artificial groundwater re-charge is very much aligned with Government's "Recharge Pakistan program".

Analysis of specific technology barriers to the diffusion and replication of this technology in the country are identified as essential barriers which include;

1) **Non-Financial Barriers Policy, legal and regulatory**

a. Poor understanding of existing water rights and rules, specifically in the indigenous rainwater harvesting systems.
b. Inequitable distribution of water among water users at the community level is an important element of this aspect of barrier.
c. Public awareness regarding the potential of rainwater as source of urban flood in the wake of changing climate.
d. Limited external support to community level water managers
e. Gender mainstreaming and engagement of stakeholders at all levels especially community level

2) **Technical**

a. High labour demand especially with some technical skill to reconstruct temporary diversion weirs and intake structures
b. Inadequate capacity and local skills to identify the suitable rain catchments, as well as suitable sites for construction of rainwater harvesting ponds
c. Weak capacity of research institutions to assist local communities in identifying the suitable technologies and suitable sites for artificial groundwater recharge well/inverted wells
e. Limited capacity of communities, especially women, both in terms of know-how and material resources to sustainably maintain and manage the technology.

3) **Social, cultural and behavioural**

a. A great variation in land tenure structures exist at the community levels with limited understanding among technology developers and practitioners. A conflict in land tenure may reflect complexity of the management of risk associated with the technology that increases inequalities and inequitable access to resources among various social groups and members.
b. The tradition of community-run-systems is limited, scattered and mostly neglected in the country. Therefore, the involvement and participation of community members in the decision-making processes related to technology development and implementation largely remains ignored.
c. General perception that the technology is suitable only for water scarce areas.
d. Limited understanding of phenomena of climate change for causing flooding due to rain or drought in the absence of it

4) **Economic and Financial**

a. As the technology is identified as a public good, so its development, operation and maintenance etc. generally proves difficult due to insufficient resources such as low program budget compared to high cost of feasibility studies including cost benefit analysis, financial analysis, or environmental impact assessments to gather sufficient information for a sound decision-making purpose.

b. In case of donor funding, there is a lingering amount of uncertainty on the continuity and success of project once the project is over. This causes technology ownership issues at the community level.

c. Burden of public wish list on the government particularly for development project. This wish list is driven by the perceptive high costs of small interventions in the community mind set.

Sectors:

Please indicate the main sector(s) related to the technology concept:

☐ Agriculture	☐ Coastal zone management	☒ Disaster risk reduction	☐ Food security
☐ Forests	☐ Human health	☐ Marine and fishery	☒ Rural development (resilience)
☒ Urban development (resilience)	☒ Water management		

Please add other relevant sectors:

Cross-sectoral enablers and approaches:

Please indicate the main cross-sectoral enablers and approaches:

☐ Communication and awareness	☐ Economics and financial decision-making	☒ Governance and planning	☒ Community based
☒ Disaster risk reduction	☐ Ecosystems and biodiversity	☐ Gender	

Technology concept requested (up to one page):

Founded on the problem statement, past/on-going efforts and technology barriers, please describe the technology concept. The technology concept should clearly contribute to adaptation to climate change as described in the problem statement and contribute to overcome the specific technology barriers.

Within a clearly defined scope, the description of the technology concept should be structured into the following:

- *Overall objective*

- *Anticipated groups of activities to be performed by the micro-grants project*
- *Anticipated products to be delivered by the micro-grants project*

Please note that UNEP-CTCN facilitates technical assistance and is not a project financing mechanism.

Overall Objective: "Improve the effectiveness and durability of adaptive capacities of water sector through promotion of surface rain water harvesting technology adoption"

Rainwater harvesting is basically a collection, diversion and storing of rainwater runoff to supplement other formal setup of water collection and distribution system for a community for its later use during dry periods. Rainwater runoff collected in temporary storages is typically used for non-potable purposes, including irrigation, livestock and general domestic use.

The technology addresses two broad categories for rainwater harvesting;

a) collecting rainfall from ground surfaces utilizing 'micro-catchment' to divert or slow runoff for storage purposes and;

b) Rainwater harvesting for groundwater recharge through inverted well technology for controlling urban flooding

The technology offers many benefits during seasonal dry periods and droughts especially in the face of climate change that is projected to increase the variability and intensity of rainfall in the long run. Rainwater harvesting for groundwater recharge helps to stabilize the depleting groundwater level while the storage infrastructure can reduce land erosion and flood inflow to major rivers. Moreover, it checks the flow of flood water and prevent urban flooding. It acts as a convenient source of stored water that could enhance agricultural productivity, decrease travel time for rural women to remote water resources that would result in better health and time for social activities.

Anticipated Activities:

- Policy advocacy for technology transfer action plan of rain water harvesting and rain water harvesting for groundwater recharge at community and sub national level
- Design behavioral change communication campaign to raise awareness on the future negative impacts of climate change on our water resources and how it would affect socially, economically, environmentally and adaptation of individuals, vulnerable communities and society to the
- Enhance the participation of key stakeholders and vulnerable communities (especially young girls and women) during key stages of decision-making processes by local administrative units
- Strengthen technical, institutional and organizational capacity of local administrative units for developing operational policies and procedures for participation of vulnerable community in swift and sustainable technology adoption
- Collaboration for R&D to upgrade and scale up rain water harvesting technology adoption for adaptation

- Promote public private partnership for constructing community and public run surface rain water harvesting devices

Anticipated Deliverables:

- Strengthened the participation of local communities in improving water and sanitation management
- Increased ability of vulnerable communities to adapt to the adverse impacts of climate change
- Improved effectiveness and durability of adaptation actions
- Build the resilience of socioeconomic and ecological systems for the betterment of the society
- Effective public, public-private and civil society partnerships for R&D to upgrade and upscale technology adoption
- Integrated ecosystems and biodiversity values into national and local planning, development process poverty reductions strategies

Expected timeframe:

Please indicate the expected duration period for the micro-grants project. Please note that the micro-grants project is limited to a maximum duration of 18 months.

Planned Duration is 15 months, starting from effective date of project start till completion.

Anticipated gender and other co-benefits from the technology concept:

Please describe the activities with gender linkages as well as the anticipated gender and other co-benefits (e.g. biodiversity, economic, social, cultural, etc.) that are likely to be generated as a result of the micro-grants project.

For more information you can find guidelines on the CTCN's website here:
https://www.ctc-n.org/technologies/ctcn-gender-mainstreaming-tool-response-plan-development

Further reading on gender can be found on the CTCN website here:
https://www.ctc-n.org/technology-sectors/gender

Key stakeholders:

Please list the stakeholders who will be involved in the implementation of the micro-grants project and describe their role during the implementation (for example, government agencies and ministries, academic institutions and universities, private sector, community organisations, civil society, etc.).

Stakeholders	**Role to support the implementation of the micro-grants project**
National Designated Entity	Ministry of Climate Change, Government of Pakistan
Designated Authority	Mr. Muhammad Irfan Tariq

	Director General (Environment) **Ministry of Climate Change, Government of Pakistan** LG&RD Complex, G-5/2, Islamabad, Pakistan Tel: +92-51-9245528 Fax: +92-51-9245533 Email: mirfantariq@gmail.com
Applicant	*Please add name of the organisation, name of the contact person, position, email and address of the organisation.* *Mr. Faizan Ul Hasan* *Project Manager - Water Recharge* *PCRWR-Ministry of Science & Technology* *faizan_ul_hasan@hotmail.com* *Ministry of Climate Change will be the focal organization for the coordination and strategic guidance to key stakeholders for the surface rain water harvesting. PCRWR is a government entity that has the mandate for research and development of technologies related to surface rain water harvesting. PCRWR will conduct all the activities related to capacity building, institutional strengthening , development of BBC campaign and design and building of pilot rain water harvesting model.*
Please add as many stakeholders and lines as required.	• Ministry of Climate Change (MoCC) • Global Change Impact Study Centre (GCISC), Islamabad • National Disaster Management Authority (NDMA) • Forestry Environment and Wildlife Department, Khyber Pakhtunkhwa (KPK) • Agriculture Department, KPK • Irrigation Department, KPK • Local Government Elections and Rural Development Department, KPK • Department of Environmental Science, Gomal University, KPK • Community and Faith based organizations • LUCKY CEMENT Limited

Alignment with national priorities (up to 2000 characters including spaces): *Please describe how the technology concept is consistent with national climate priorities such as: Nationally Determined Contribution, national development plans, poverty reduction plans, Technology Needs Assessments, Technology Action Plans, National Adaptation Plans, sectorial strategies and plans, etc.*	
Reference document (please include date of document)	**Extract** (please include chapter, page number, etc.).

Pakistan's Intended Nationally Determined Contribution (Pak-INDC), 2016	*Direct alignment and contribution to NDC implementation is required. Please include a direct reference to the INDC/NDC document (chapter, page number, etc.).* 2.1 Policy Initiatives, (page number 12), 2.2 Adaptation, (page number 15)
Pakistan Technology Needs Assessment for Climate Change Adaptation - Barrier Analysis and Enabling Framework, 2017	Chapter 2 Water Sector, 2.2 Barrier Analysis and Possible Enabling Measures for Surface Rainwater Harvesting Technology
Pakistan: Technology Needs Assessment for Climate Change Adaptation, 2016	Chapter 1, 1.3 Sector selection for the TNA Process, Chapter 2 Institutional Arrangement for the TNA Process and Stakeholders Involvement, Chapter 3 Technology Prioritization for Water Sector, 3.4.2.2 Results of Technology Prioritization
Pakistan: Climate Adaptation Technology Action Plans & Ideas 2016	Chapter 3, Technology Action Plan for the Water Sector of Pakistan 3.1 Actions at sector level 3.2 Action Plans for Surface Rain Water Harvesting Technology
Pakistan Vision 2025	Pillar IV: Energy, Water and Food Security, (page number 9) 25 Goals of Pakistan Vision 2025: Goal 15 (page number 14)
National Climate Change Policy 2012	4. Climate Change Adaptation, (page number 3), 4.1 Water Resources, Policy Measures, II. Water Conservation Strategies, b. Introduce local rainwater harvesting measures, (page number 4)
National Water Policy	2. Policy Objective, 2.15 Promoting appropriate technologies for rain water harvesting in rural as well as urban areas, (page number 7)
Country Profile Pakistan - Describing South and South East Asia	1.2 Projection on climate impacts comparing 1.5°C and temperature increase under current pledges, (page number 4)
Aligning Nationally Determined Contributions and Sustainable Development Goals: Lesson Learned and	5. Targets, (page number 11)

Practical Guidance. UNDP Pakistan	
NDC Partnership – NDC Country Outlook PAKISTAN	Country Ambition, (page number 2,3) South-South Exchange: Plans and Funds as Tool to Move Forward, (page number 7)
Paris Agreement	Article 7, (page number 9,10,11)
The 2030 Agenda for Sustainable Development Goals (SDGs)	Goal 17, Target 17.7, Indicator 17.7.1 Goal 17, Target 17.9, Indicator 17.9.1 Goal 15, Target 15.9, Indicator 15.9.1 Goal 6, Target 6.b, Indicator 6.b.1,

Development of the technology concept (up to 2000 characters including spaces):

Please describe how the technology concept was developed at the national level and the process used by the NDE and the Designated Authority to approve the technology concept before submitting it (who initiated the process, who were the stakeholders involved and what were their roles?) and describe any consultations or other meetings that took place to develop and select the technology concept, etc.

Technology Needs Assessment (TNA) is one of the foremost critical steps towards identifying and assessing climate change adaptation challenges within the United Nations Framework Convention on Climate Change's (UNFCCC) technology mechanism on technology development and transfer.

Pakistan's TNA process largely remained country driven, participatory in nature for identifying its priority technologies to adapt for sectors economically important and vulnerable to climate change. Pakistan adopted three tiered approach which included to a) identify sustainable development needs and priorities of the country in the face of climate change challenges; b) identify and prioritize climate vulnerable sectors; c) identify, assess and then prioritize adaptation technology needs of the country within these prioritized sectors through multi criteria decision analysis (MCDA) tool. This whole process was supported by a national and global TNA institutional structure and multi stakeholder's engagement and consultation processes to ensure legitimacy, and earn strong political support for the process. During this entire process, the Director General Environment & Climate Change, Ministry of Climate Change acted as a national TNA focal person, largely facilitating communication and coordination with the National TNA Committee and other relevant institutions, consultants for adaptation and mitigation technologies, Sectoral Expert Working Groups and other stakeholders. To improve the legitimacy and transparency of the process, the National Climate Change Policy Implementation Committee was designated as the National TNA Steering Committee with the function to provide high level guidance to the work of national TNA teams.

Background documents and other information relevant for the technology concept:

Please list all relevant documents that will help UNEP-CTCN analyse the context of the technology concept and national priorities. Please note that all documents listed/provided should be mentioned in the technology concept in the relevant section(s), and that their linkages with the technology concept should be clearly indicated. For each document, please provide web-links (if available) or attach to the form. Please add any other relevant information as required.

Pakistan Vision 2025:
(https://www.pc.gov.pk/uploads/vision2025/Vision-2025-Executive-Summary.pdf)

National Climate Change Policy:
(http://www.mocc.gov.pk/SiteImage/Policy/National%20Climate%20Change%20Policy%20of%20Pakistan%20(2).pdf)

National Water Policy:
(https://www.pc.gov.pk/uploads/report/National-Water-Policy.pdf)

National Forest Policy:
(http://www.mocc.gov.pk/SiteImage/Policy/National%20Forest%20Policy%202015%20(9-1-17).pdf)

Pakistan Technology Needs Assessment for Climate Change Adaptation:
(http://www.mocc.gov.pk/SiteImage/Misc/files/Pak%20TNA%20Adaptation%20Final%20March%202016%20(29-3-17).pdf)

Pakistan Climate Adaptation Technology Action Plans and Ideas:
(http://www.mocc.gov.pk/SiteImage/Misc/files/TAP_Adaptation%202017.pdf)

Pakistan Technology Needs Assessment for Climate Change Adaptation - Barrier Analysis and Enabling Framework:
(http://www.mocc.gov.pk/SiteImage/Misc/files/PAK%20TNA%20BAEF%20FINAL%20DEC%202016%20(29-3-17).pdf)

Third Party Validation Study Report of Green Pakistan Programme – Reclamation and Development of Forest Areas Phase – I(2016-17 Targets, Punjab, Pakistan)
(http://dgmepunjab.gov.pk/download/third-party-validation-study-report-green-pakistan-programme-reclamation-and-development-of-forest-areas-in-punjab-phase-i-year-2016-17/)

The crisis of water shortage and pollution in Pakistan: risk to public health, biodiversity and ecosystem.
(https://link.springer.com/article/10.1007/s11356-019-04483-w)

Public Sector Development Programme 2020-21
(https://www.pc.gov.pk/uploads/archives/PSDP_2020-21.pdf)

Countries at the most risk from water crises:
(https://www.bloomberg.com/graphics/2019-countries-facing-water-crisis/)

Gender mainstreaming and climate change:
(https://sci-hub.do/https://www.sciencedirect.com/science/article/abs/pii/S0277539513000204)

Virtue and vulnerability: Discourses on women, gender and climate change:
(https://sci-hub.do/https://www.sciencedirect.com/science/article/abs/pii/S0959378011000069)

ADAPTATION FUND: Mid Term Strategy 2018-2022
(https://www.adaptation-fund.org/document/medium-term-strategy-2018-2022/)

Consultation with the Designated Authority of the country:

Please indicate whether the technology concept has been developed in consultation with the Designated Authority of the country.

☒ The Designated Authority of the country has been engaged in the design of the technology concept and will be involved in the further process leading to the implementation of the micro-grants project.

Monitoring and evaluation:

By signing this form, I affirm that processes are in place in the country to monitor and evaluate the micro-grants project funded by the Adaptation Fund through UNEP-CTCN. I understand that these processes will be explicitly identified in the Project Concept Note (response plan of the micro-grants project) and that they will be used in the country to monitor the implementation of the micro-grants project.

I understand that, after the completion of the micro-grants project, I shall support UNEP-CTCN efforts to measure the success and effects of the support provided, including its short, medium and long-term impacts in the country.

Signature:

NDE name:	Mr. Irfan Tariq, Ministry of Climate Change
Date:	30 -1-2021
Signature:	

THE COMPLETED FORM SHALL BE SUBMITTED THROUGH A WEB-LINK AS BELOW:

https://www.ctc-n.org/adaptation-fund-climate-innovation-accelerator-afcia-unep-ctcn

UNEP-CTCN is available to answer all questions and provide guidance on the application process.