

Concept Note

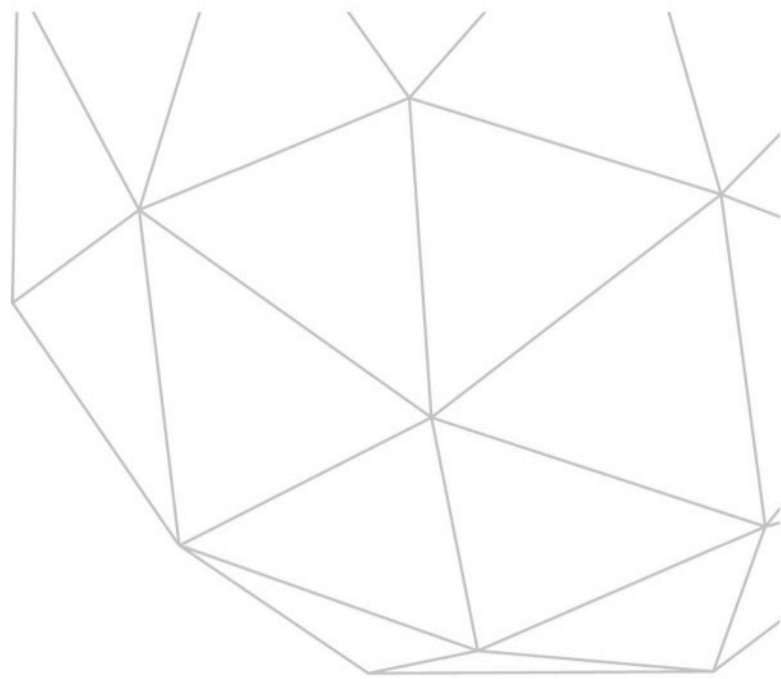
Scaling-Up Climate-Resilient Practices in Agriculture and Water Management in Turkmenistan

Turkmenistan | United Nations Development Programme (UNDP)

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**GREEN
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Green Climate Fund Concept Note

The Green Climate Fund (GCF) is seeking high-quality projects or programmes.

Accredited Entities may choose to submit a concept note, in consultation with the relevant national designated authority, to present the proposed project or programme idea in order to receive early feedback and recommendation.

Project/Programme Title: Scaling-Up Climate-Resilient Practices in Agriculture and Water Management in Turkmenistan

Country/Region: Turkmenistan/ Europe and the CIS

Accredited Entity: United Nations Development Programme

National Designated Authority: State Committee for Environmental Protection and Land Resources of Turkmenistan



Please submit the completed form to fundingproposal@gcfund.org¹

I. Project / Programme Information	
1.1. Project / Programme Name	Scaling-Up Climate-Resilient Practices in Agriculture and Water Management in Turkmenistan
1.2. Project or Programme	Project
1.3. Country (ies) / Region	Turkmenistan
1.4. National Designated Authority(ies)	State Committee for Environmental Protection and Land Resources of Turkmenistan
1.5. Accredited Entity	United Nations Development Programme (UNDP)
1.6. Executing entity / Beneficiary	Executing Entity: State Committee for Environmental Protection and Land Resources Direct Beneficiaries: 250,000 small-scale farmers and their families Institutional beneficiary: Ministry of Agriculture and Water Resources (MAWR)
1.7. Access modality	Direct <input type="checkbox"/> International <input checked="" type="checkbox"/>
1.8. Project size category (total investment, million USD)	Micro (≤ 10) <input type="checkbox"/> Small ($10 < x \leq 50$) <input type="checkbox"/> Medium ($50 < x \leq 250$) <input checked="" type="checkbox"/> Large (> 250) <input type="checkbox"/>
1.9. Mitigation / Adaptation focus	Mitigation <input type="checkbox"/> Adaptation <input checked="" type="checkbox"/> Cross-cutting <input type="checkbox"/>
1.10. Results areas (mark all that apply)	<i>Which of the following targeted results areas does the proposed project/programme address?</i>
	<p>Reduced emissions from:</p> <p><input type="checkbox"/> Energy access and power generation (E.g. on-grid, micro-grid or off-grid solar, wind, geothermal, etc.)</p> <p><input type="checkbox"/> Low emission transport (E.g. high-speed rail, rapid bus system, etc.)</p> <p><input type="checkbox"/> Buildings, cities, industries and appliances (E.g. new and retrofitted energy-efficient buildings, energy-efficient equipment for companies and supply chain management, etc.)</p> <p><input type="checkbox"/> Forestry and land use (E.g. forest conservation and management, agroforestry, agricultural irrigation, water treatment and management, etc.)</p>
	<p>Increased resilience of:</p> <p><input checked="" type="checkbox"/> Most vulnerable people and communities (E.g. mitigation of operational risk associated with climate change – diversification of supply sources and supply chain management, relocation of manufacturing facilities and warehouses, etc.)</p> <p><input checked="" type="checkbox"/> Health and well-being, and food and water security (E.g. climate-resilient crops, efficient irrigation systems, etc.)</p> <p><input type="checkbox"/> Infrastructure and built environment (E.g. sea walls, resilient road networks, etc.)</p> <p><input type="checkbox"/> Ecosystems and ecosystem services (E.g. ecosystem conservation and management, ecotourism, etc.)</p>
1.11. Project / programme life span	6 years
1.12. Estimated implementation start and end Date	Start: ...March 2018..... End: ... February 2024.....

¹ Please use the following naming convention for the file name: “[CN]-[Agency short name]-[Date]-[Serial number]” (e.g. CN-ABC-20150101-1).

II. Project/Programme Details

The Fund requires the following preliminary information in order to promptly assess the eligibility of project/programme investment. These requirements may vary depending on the nature of the project/programme.

<p>.1. Project/programme description (including objectives)</p>	<p>Context and objectives</p> <p><i>Climate change in Turkmenistan</i></p> <p>For the past six decades, climate warming has been observed and documented in the desert country of Turkmenistan as occurring at a faster pace than in many other parts of the world. The average air temperature has increased by almost 2°C between 1950 and 2010². Already extremely hot and dry, the country is projected to experience an increase in average annual air temperature by 2.21 °C by 2040, with further warming of 5.35 °C by 2100 (averaging scenario, TNC). Furthermore, hydro-meteorological modeling forecasts steadily declining precipitation nationwide. In the next 30 years the amount of precipitation will slightly decrease, but since the end of 2040ies it will fall dramatically by 22 percent through 2100 (TNC). The country will also face a reduction of the flow of the Amu-Darya River, the nation's main source of water, by 10-15 percent by 2050 (TNC). These trends will be accompanied with an increase in the frequency and severity of natural disasters caused by climate change (droughts, floods, wind storms). Climate change outlook of Turkmenistan is presented in the Annex II.</p> <p><i>Climate change impacts on agriculture and water sectors of Turkmenistan</i></p> <p>Turkmenistan depends directly on irrigated agriculture for food security and the economic livelihoods of about half of its 5.2 million citizens. Agriculture contributes 10% of GDP and employs 50% of the population. Livestock, wheat and cotton production are the main sectors of economic activity in the agricultural sector. The success and sustainability of agriculture are therefore centrally important development priorities of the country.</p> <p>Agriculture is the main consumer of water in Turkmenistan and the most vulnerable sector to climate change. In the short and medium term, the direct impact on crop yields as a result of changes in temperature and rainfall patterns are expected, in addition there will be an increase in the length of the growing season. The most significant impact on the agricultural sector is related to the declining availability of water resources. Projected climate change will be causing the reduction of river flow, increasing evaporation rate from water surface and evapotranspiration. Irrigation norms for the key crops will have to increase by 13% by 2030-2040 due to climate change. These processes will lead to climate-induced water deficit of up to 5.5 km³ / year. This is equivalent to approximately 20% of the Turkmenistan water resources. Significant negative impact on productivity are expected, both in the crops sector and in animal husbandry. Irrigation water deficit can lead to significant economic losses in agriculture: reduction in wheat production by nearly 4 million tons, and in cotton production by 3 million tons is expected during the 15-year period (2015-2030). The economic damage related to the climate-induced decline in crops production could reach \$ 2.5 billion per year by 2030, reaching the total of \$ 20 billion (discounted) in 2015-2030. Furthermore, it may lead to decrease in livestock numbers and productivity of livestock due to water scarcity. These findings are consistent with other recent studies conducted by the World Bank in Central Asia (2013). See section 4.4. below and the Annex II. for more detailed information on climate vulnerability of agricultural sector.</p> <p>The threat of climate change looms with particular danger for hundreds of thousands of small farmers who hold leases for only up to a few hectares to grow state-mandated crops, especially wheat and cotton, and are restrained in investing into climate resilient technologies and equipment. The climate-induced reductions in agricultural productivity could push these farmers' fragile livelihoods beyond the breaking point.</p> <p><i>Commitment of the Government of Turkmenistan (GoT) and adaptation solution</i></p> <p>To date, the Government of Turkmenistan (GoT) has defined very broad strategic priorities on climate change adaptation in its National Climate Change Strategy, adopted in 2012, and a proposed National Economic Program of Action on Adaptation and Mitigation. Turkmenistan's INDC (2015) has a strong focus on adaptation to climate change, emphasizing agriculture and</p>
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² Third National Communications of Turkmenistan under UNFCCC (TNC), 2015

water management as the most vulnerable sectors requiring urgent adaptation action. The GoT have already initiated transformative reform in its water and agriculture policies that includes privatization and diversification of agricultural production and reconsidering water and energy subsidies³. The government programmes and investments in agriculture and water sector are described below in the baseline activity section. Adaptation measures in actual farms have been implemented with considerable success but only on a pilot basis so far, under the auspices of three projects, funded by the GEF and the Adaptation Fund and conducted jointly by the United Nations Development Programme (UNDP) and the Government. There is an urgent need for concrete scale-up at the level of real agricultural practice.

Therefore, the GoT is proposing a new project to scale up climate-resilient agricultural and water-management practices in Turkmenistan, emphasizing direct financial, technical, and informational interventions among smallholder farmers and the state-run collective associations in which they work.

The **project's objective** is to reduce the vulnerability of smallholder farmers and their dependents to climate change and its accompanying problems of water scarcity and reduced crop yields. The project will seek to generate the following benefits:

- *Transformative national and sectoral policy reform in state crops sector for scaling-up climate-resilient agriculture, and improved enforcement of water and land use regulations.*
- *Accelerated wide-scale dissemination of water saving and resilient farming technologies and practices among smallholder farmers and state-run collective associations.*
- *Enhanced knowledge and capacities of smallholder farmers and associations in planning and management of climate-smart irrigation and farming.*
- *Enhanced and scaled-up delivery of climate information to smallholder farmers based on improved state agrometeorological monitoring and forecasting services.*

Baseline development and baseline investment activity

Baseline vulnerability of agricultural sector in Turkmenistan

During the last few decades, Turkmenistan has experienced widespread changes in land cover and land use following the socioeconomic and institutional changes in the wake of the disintegration of the Soviet Union, and subsequently followed by a decade of drought and steadily increasing temperatures. These changes in the vegetated landscape are sufficiently broad to be detectable from orbital sensors at multiple scales. One of the key underlying causes for vulnerability of the agricultural sector in Turkmenistan is the inefficient water consumption due to outdated approaches to managing water, deteriorating irrigation infrastructure and subsidized water prices. The water subsidies make the current water system financially unsustainable, and dampen the private sector to invest in the absence of conducive financial mechanisms and economic instruments. The reform to water tariffs was initiated by the GoT with the adoption of the new Water Code (2016), see below.

The agriculture sector in Turkmenistan is largely controlled by the state, however, the Government has been gradually promoting the policy of privatization mainly in the livestock sector. The Livestock subsector is dominated by the private sector, with more than 80% of all products produced by private farmers. The Fruit and Vegetable subsector is the most independent of the agricultural sector in Turkmenistan with almost 100% of production is generated privately both by independent farmers and leaseholders. The Crops subsector is managed by the state and focuses largely on state mandated crops such as cotton, wheat and sugar beet. Consequently, almost all public sector investments are directed at cotton and wheat, based on government policy of self-sufficiency in grains and maintaining the export potential for cotton products. The system of private agricultural enterprise is growing, the larger enterprises successfully pursue available financing, apply advanced technology and practices, and make good money on cash. But the collective farming system and the hundreds of thousands of leaseholding small farmers who work within it have been much slower to innovate. As a result, the collective system and its farmers employed in state-order crop sectors will be increasingly vulnerable as the effects of climate change manifest themselves. Smallholders lease small plots of land from the state-run collective associations. But the character of their work is that of laborers rather than independent contractors. Smallholders

³ <http://www.dw.com/en/turkmenistan-leader-wants-to-end-free-power-gas-and-water/a-39152012>

are obligated by the collective association to meet a quota for the given state-mandated crop, while remaining within a limited allotment of water.

In recent years, the Government has begun to recognize the need to diversify the agricultural sector and acknowledges the inefficiencies of enforcing cotton and wheat production in all regions of the country. This effort has been constrained by the increasing frequency of drought in agricultural producing regions, and the associated economic losses experienced by the state. The state has in recent years, allocated some land for crops other than the government mandated crops to be grown in each of the five provinces based on soil and climatic conditions in these regions. As a result of this, each province has been allocated land on a leasehold basis for growing maize, barley, lucerne and other forage crops, a practice aimed at promoting crop rotation and thus improving soil quality. The government is also beginning to invest in high efficiency irrigation technology for water intensive crops, to include drip irrigation systems, mobile sprinklers and wastewater drainage and recycling. Information on national policies and funding to address these development challenges is provided below.

National policy mandates

The national program “Fundamental Directions of Economic, Political, and Cultural Development of Turkmenistan in the period up to 2020” calls for the Ministry of Agriculture and Water Resources (MAWR) to implement sustainable land use in agriculture, as well as rational use of water. State-supported activities in these areas include innovation in irrigation and agricultural practice; creation and maintenance of new and existing collector-drainage networks; expanded crop rotation; renovation and planting of new shelterbelts and woodlands, as measures to conserve soil and moisture; development and implementation of standards for use of fertilizer and other chemicals; and land reclamation.

A revised national Water Code was adopted in October 2016. This comprehensive law defines conditions for water use and water management in Turkmenistan, especially in agriculture. Notably, it contains progressive provisions, which UNDP projects helped develop, for encouraging innovation and conservation – including the gradual introduction of water metering and tariffs, and the affirmation of the legal status of water user groups, a promising new model by which smallholder farmers can band together for planning and project implementation.

In 2012, the Government adopted the National Climate Change Strategy (NCCS), which was developed with UNDP support. The NCCS is intended to give substance to Turkmenistan’s commitments to both climate change mitigation and adaptation, while supporting the nation’s continued economic growth through modernization, diversification, and strengthening global competitiveness. In order to operationalize implementation of the NCCS, the National Economic Program of Action on Adaptation and Mitigation (NEPAAM) for 2016-2020 has been prepared. Among other broader goals, the NEPAAM calls specifically for innovation in the management of irrigation and drainage water and for climate-resilient land use practices aimed at reducing vulnerability of the sector and improving the lives of farmers as one of the most vulnerable groups subject to the effects of climate change.

State financing for farmers and collective associations

The GoT offers several subsidized loan programmes for different types of agricultural production. The state commercial agricultural bank Daikhanbank is by far the largest channel of the state loans to the agricultural sector. Approximately 10 percent of Daikhanbank loans are issued to private farmers and entrepreneurs, while the majority of funds is channeled to large agricultural collective associations (daikhan associations) on state-owned land, which are dedicated almost entirely to fulfilling state orders for production of wheat, cotton, rice, and sugar beets.

The most favorable preferred credit is issued by Daikhanbank to farmers and collective associations producing state-order crops for the purchase of agricultural equipment, tools, and devices, water-conserving irrigation equipment, and pipelines, for a 10-year term based on expected equipment lifetimes, with annual levelized repayments and an annual interest rate of 1 percent. This credit program was developed by the Central Bank of Turkmenistan in accordance with an order of the President of Turkmenistan entitled “On Financial Support for Producers of Agricultural Products” from 6 March 2013.

Financing of other types of agricultural activity – such as husbandry of livestock and fowl, production and recycling of agricultural products beyond the state-order crops, and various other services carried out by private agricultural enterprises and individual smallholder farmers – are also subject to concessional lending, for ten-year terms with an annual interest rate of 5 percent.

Loans to private farmers and individual smallholder farmers require collateral. Daikhanbank loans to the large agricultural collective associations are exempt from collateral and guaranteed with cash reserves and future yields. In addition, the Union of Industrialists and Entrepreneurs of Turkmenistan, through its associated bank called Rysgalbank, is running its own loan programme with GoT funds targeting more sophisticated private farmers who are dues-paying members of the Union, and who grow mostly high-margin crops such as fruits and vegetables. The current financing instruments serve well the larger private farms and enterprises, which have no problems with collateral. However, hundreds of thousands of smallholder farmers who work in the large collective farms and also have their individual household plots are largely left apart from these subsidized loan programmes due to a series of barriers described below.

There are no operational insurance or loan guarantee schemes for the agricultural sector. The Government has been encouraging development of new private insurance instruments but the work is still in progress.

Barriers to climate resilience

The barriers that have been impeding scaled-up implementation of climate resilience in the agricultural sector of Turkmenistan fall into three main areas.

1. Insufficient capacity in agrometeorological monitoring, forecasting, analysis and delivery of climate information and advice to the sector planners and to farmers. The State Committee on Hydrometeorology (known familiarly as Hydromet) conducts nationwide weather and climate monitoring, delivering daily regional weather forecasts with projections out to a maximum of 10-14 days. The Government recently financed installation of new automated observation stations across the country including agrometeorological monitoring equipment. However, existing human capacity, access to modern modelling and forecasting technologies, and international cooperation have been insufficient. Sectoral planning in agriculture and water sectors is not sufficiently informed about long term climate change impacts and climate risks. Climate advisories or other climate information products for farmers are not available. Hydromet staff note their need for updated modelling software and training on international best practices.

2. Limited capacities of existing extension services to spearhead climate resilience at scale. Limited agricultural extension services are offered via district administrations and collective associations, but are insufficiently reflective of climate-resilient best practices in efficient water management and sustainable land management. District and collective extension services are also often located at a prohibitive distance from farmers who need them, without Web-based or other means to bridge the barriers of time and space. There have been recent program efforts to improve extension services, including an EU-supported project called AgroNet, but these have proven unsustainable and are no longer operational. Daikhanbank has its own agricultural experts in all local branches, however, their mandate is limited with the control over the timing and area of crop planting.

3. Limited access to climate resilient equipment and technologies among smallholder farmers

Available state financial support for agricultural sector is ineffective in delivering resources to small holder farmers for innovation and access to resilient technologies. Smallholder farmers widely lack the financial capacity to procure equipment, including advanced irrigation equipment and field machinery, which is needed for efficient water use, sustainable soil management, and maximal crop yields. Loans are nominally available from the Daikhanbank, but almost no smallholders pursue them. Collective associations, in their turn, lack incentives, formal mandate and skills for efficient water management and thus do not invest into on-farm water efficient technologies. The following are specific indicative barriers hampering access to finance and investments into increased on-farm water efficiency:

- The cost of technologies remain too high compared to the prices for the state-order crops. Increased yields do not result in strong financial rewards sufficient for investing into new technologies.
- Taken individually, smallholders' plots are too small for many types of water-conservation and land melioration projects. Coordination and legal mechanisms are needed for smallholders to band together for joint projects.
- Smallholders lack collateral required for loans.

- Smallholders lack financial literacy to apply for and manage loans. The paperwork burden for small loans is prohibitive for Daikhanbank as well.
- Although the Land Code allows for up-to 10-year long leases between the collective associations and individual farmers, in practice the smallholders' leases are mostly very short (most commonly only one year), thus preventing application of on-farm irrigation and drainage technology and the possibility of long-term servicing of loans.
- Water User Groups (WUGs) recently established under the new Water Code have adequate size of combined plots and incentives/mandate to invest into water efficiency. However, they are not legal entities and cannot borrow directly from Daikhanbank. Their capacities remain very low, and the mechanism is still in its nascent phase.

In its project on climate risks in farming, UNDP has created and promoted the model of WUGs, in which smallholders can band together for project planning and management. This model has been successful at pilot scale. Further assistance is required over at least the next few years to secure scale-up and sustainability. Legal and management models between WUGs and collective associations need to be elaborated to allow for these groups to borrow money and own equipment. Other legal forms for collective investments into water efficiency need to be elaborated and operationalized.

4. Incomplete policy, planning and regulatory framework

Despite recent shifts towards diversification of crop production, the national planning in agricultural sector still prioritize investments into water intensive crops mainly driven by considerations of national food and export security. The national planning is not fully informed of and doesn't adequately integrate long term climate risk analysis. Regulatory barriers include insufficient incentives and mandate of the collective associations, land tenure issues, pricing policy for state-order crops, etc.. The new Water Code does call for the introduction of water tariffs and consumption-based billing as well as for the promotion of new collective forms of water management (WUAs and WUGs). However, secondary legislation, regulations and timetables for actual implementation are lacking. One major barrier is the absence of water measurement/reporting protocols at the farm level that hamper enforcement of existing water use norms.

Baseline projects

UNDP have been implementing three projects in Turkmenistan with direct relevance to the new proposed GCF project.

Supporting Climate Resilient Livelihoods in Agricultural Communities in Drought-Prone Areas of Turkmenistan. This project was approved by the Special Climate Change Fund of the Global Environment Facility (GEF) in 2016 for the implementation in 2016-2021. It has been supporting three interrelated components: (i) improving climate-related socioeconomic outcomes in targeted agricultural communities in Lebap and Dashoguz velayats through the implementation of community-based adaptation solutions; (ii) mainstreaming climate adaptation measures in agricultural and water sector development strategy and policy; and (iii) strengthening national capacity for iterative climate change adaptation planning, implementation and monitoring in the country.

Energy Efficiency and Renewable Energy for Sustainable Water Management in Turkmenistan. This GEF-funded project was launched in 2015. Its main goal is to increase energy efficiency in the water-management sector via various approaches, including reduction of water losses, which in turn would reduce the need for pumping. This project includes an activity on technical proving and demonstration of new irrigation technology, including drip and sprinkler systems. It also includes an activity on development, production, and deployment of canal lining materials to reduce infiltration losses and salinization of affected lands. All technical work of the project is intended not only to increase know-how among farmers and scientists, but also to create financial justification for scaled-up state and private investment. The project also includes activities addressing planning and policy at the regional and national levels.

Addressing Climate Change Risks to Farming Systems in Turkmenistan (2012-2017). This project, under support from the Adaptation Fund (AF), focuses on strengthening water management practices at the community level and developing integrated water management policies at the national level. It is being carried out in three different climatic areas: 1) the

Karakum Desert (Bahardok); 2) the mountain villages of Nohur; and 3) an irrigated area of the Sakarchaga region.

This project has achieved considerable successes, including:

- Formation of the country's first water user groups. Now there are nine such groups in the country.
- Creation of a technical manual in Turkmen and Russian describing climate-resilient practices and technologies, including laser leveling, drip and sprinkler irrigation, cleaning of drainage collectors, and more.
- Completion of a comprehensive analysis in Turkmen, Russian, and English of socioeconomic benefits that would arise from implementation of these new administrative models and technical approaches
- Delivery of training in all the pilot regions
- Support for comprehensive reform of the national Water Code.

These three UNDP-led projects, in particular the Adaptation Fund supported project, will provide tested technological solutions for scaling up through the GCF investment and national loan finance.

Description of the proposed GCF project

The new GCF project will remove barriers and turn the nation's strategic priorities and baseline activities into changes in practice on the ground on a national scale, thereby reducing the climate vulnerability of the country and its most vulnerable citizens in the agricultural sector. The project will include the following components and activities.

Output 1. Climate information, agrometeorological and extension services

This component will directly address the first and the second barriers noted above, regarding insufficient extension and agrometeorological services. Delivery of information and know-how will lead to deployment of technology and practices to reduce water losses, remediate soil salinization, and raise yields. This work will also inform national policy development and sectoral planning under the Output 3.

Activity 1.1. Strengthening capacity of Hydromet to deliver tailored climate information and advisories for agricultural sector.

The project will deliver agrometeorology training and modeling software reflective of international best practice to the State Hydrometeorology Service. Hydromet forecasting and analytical capacities will be strengthened. The project will also assist Hydromet in expanding its capacity to deliver information on weather and climate throughout the country, especially to remote rural areas where farmers currently lack access to timely information. Finally, capacities to analyse and deliver climate information for sectoral planners and decision makers will be enhanced.

Activity 1.2. Mainstreaming climate resilience advisory services through state-run and private extension networks.

This activity will emphasize delivery of timely information on climate risks and adaptation solutions through strengthened extension services all the way down to the level of farms themselves, village by village, remedying the barriers of distance and time. This work will address a wide range of technical areas identified by UNDP's ongoing climate change adaptation projects, many of which can be addressed at minimal incremental cost:

- Assessment of the condition of land plots, including soil conditions and slopes
- Crop selection and planning
- Efficient irrigation technology
- Installation of anti-infiltration barriers on irrigation channels
- Laser-aided leveling of fields, and optimization of slopes to maximize effective use of irrigation water
- Scheduling of water rotation and optimization of water delivery, especially where adjacent fields are irrigated in sequence
- Scheduling of mechanical tilling after application of water to fields, and matching of irrigated areas to tilling capacity. (Mechanical tilling must be conducted within a day or two after application of water in order to improve drainage and minimize surface evaporation.)

- Optimization of the cross-sectional shape and layout of irrigation channels, so as to reduce water losses, simplify maintenance (removal of alluvium and weeds), and eliminate the filling of idle channels
- Where expedient, use of low-cost technologies for water withdrawal (pipes, siphons) to optimize water delivery from larger channels into smaller channels, and from smaller channels onto fields
- Assessment and fulfillment of water and forage resource potential for free-ranging livestock in desert pastures and takyrs

The GCF project will support four different avenues for the delivery of enhanced extension services to the farmers:

- (i) Strengthening and expanding capacities of state-run extension services and agricultural specialists in district administrations, collective associations and regional mechanization centres.
- (ii) Expanding the mandate and building capacities of the Daikhanbank agricultural specialists in local (etrap) branches to accompany the new subsidized loan products for the purchase of equipment and technologies.
- (iii) Delivery of tools and training for internet-based information and consultation, including ready material from the technical manual prepared by the UNDP/AF project on climate risks in agriculture.
- (iv) Building up capacities of local private sector for the provision of extension services to farmers. UNDP and national experts agree that the most sustainable long-term model for delivery of extension services is that of local private consultancies. Even now, there is no shortage of agronomists in Turkmenistan, but they need increased technical capacity and a more efficient, proactive model of service delivery emphasizing added value for the farmer and mobility for increased local presence. GCF project will train, certify, and manage specialists, facilitate their networking and self-organization. Then, the project will gradually spin off these extension services into independent consultancies around the country. The national Union of Industrialists and Entrepreneurs, the powerful state-supported association of private enterprises, will aid in this effort.

Output 2. Expanded access to climate-smart technologies and irrigation systems among small holder farmers

This component will directly address financial barriers as described above.

Activity 2.1. Mainstreaming climate resilient practices through state financial support for collective associations and small holder farmers for an accelerated wide-scale introduction of water saving and resilient farming technologies.

The state-financed subsidized loan programme for the agricultural producers is operated predominantly by the national Daykhanbank (with other private banks servicing private sector producers). The problems of access and incentives associated with this programme are outlined in the Barriers section. The project, jointly with Daikhanbank, will support expanded financial access for farmers for the procurement of climate-smart agricultural equipment and material. Such equipment and material could serve multiple plots (lined irrigation channel networks, large shared machinery for tilling, or mobile sprinkler irrigation), and/or individual plots (drip and sprinkler irrigation, small machinery for tilling). Economic assessment for various adaptation technologies and approaches piloted by the UNDP-AF project in Turkmenistan is attached in the Annex III.

Daikhanbank will secure the co-financing of this activity through its state-subsidized loan programmes. The GCF technical assistance resources will support the Daikhanbank in designing accessible and easy-to-manage loan products focusing on climate-resilient equipment packages and will provide pre-investment support to farmers. GCF project will develop legal, institutional and management models for lending to WUGs' projects and farmer collectives addressing the barriers outlined above. Government-supported risk transfer schemes will be explored during the project development phase.

The activity will be directly linked to extension services (see Output 1) on proper design, installation, operation, and maintenance of systems. The activity will be implemented in synergy with the regulatory work under the Component 3 (e.g. on pricing policies) in order to secure sustainability and to achieve a gradual reduction in the need for direct support in future.

This activity will focus on investment de-risking and expanding financial access for the most vulnerable smallholders and groups of smallholders, but similarly enhanced mechanisms for financing the purchase of climate-smart technology will also be made available for the collective associations and private enterprises. This multilevel approach will help ensure scale-up of needed practices and reduce overall climate vulnerability in the agricultural sector on the whole.

Activity 2.2. Scaled-up dissemination of laser-aided leveling.

Precision leveling of fields via laser surveying and automated scraping ensures both proper water delivery to crops and correct drainage, under either conventional furrow irrigation or sprinkler irrigation. Laser-aided leveling of fields reduces water losses by at least 20 to 30 percent, curbs salinization, and increases yields over very large areas. The technology is especially expedient in cases where drip irrigation is impractical because of water turbidity or crop needs.

But laser leveling remains almost unknown in Turkmenistan because of deficient knowledge and high cost (\$20,000-\$40,000 for a full package of surveying equipment and controls, not including the heavy grading machinery itself). As a result, the technology languishes under a perception of prohibitive technical and financial risk.

The project will support design and implementation of a state-run leasing scheme for the laser-leveling equipment co-financed by the MAWR and GCF and managed by the provincial agricultural production associations (state entities providing larger machinery and services to collective associations). The project will finance the purchase and delivery of laser leveling equipment packages (co-financed through the national budget and GCF funds), to be used with existing mechanical equipment of collective associations across the country. Each package will be used for up to 1000 hectares per year, and will be available for repeat use in subsequent years via rental arrangements to be facilitated by the project. The project will also support associated training and documentation, leading to follow-up efforts to scale up further acquisition. The bulk procurement through the national leasing scheme will help to further lower the price of the equipment for end users.

Output 3. National and sectoral policy, legislation and enforcement

This output will directly address the above-noted policy, regulation and enforcement barriers that stifle innovation and entrepreneurship among smallholder farmers, freeing them to pursue financial and technical solutions that are currently out of reach.

Activity 3.1. Climate-proofing the national and sectoral planning

The GCF project will inform and climate-proof sectoral policy and planning in water and agriculture sectors based on enhanced information about climate change impacts, risks and vulnerability generated through the activity 1.1. The purpose of this activity is to secure informed decision making by the government on the allocation of land and water for state-order crops, crop distribution, choice of less water-intensive crops, long term sectoral planning. The activity will also inform national decision making related to food security and export balances. The activity will support modeling and analysis of climate vulnerability of water and agriculture sectors and subsectors, assessment of sensitivity of agricultural production and exports to climate variability and climate change based on the projected water availability. The activity will bridge climate information delivered by the Hydromet with the MAWR sectoral planning, with the national economic planning led by the Ministry of economy, and with regional velayat development planning. Thus, the project will assist the Government in transforming the state crop sector, and defining possible shifts as warranted by changing conditions of climate, water availability, national socioeconomic needs, and the environment for Turkmenistan's participation in international trade.

Activity 3.2. Development and adoption of climate-smart provisions in Land and Water Codes and accompanying sublegislative acts.

By participating in the ongoing process of revision of the Land Code and development of accompanying sublegislative acts and regulations for the Land and Water Codes, the project will support land tenure and water management reforms to encourage entrepreneurship among smallholders and create incentives for them to adopt climate-smart technology and practices.

In particular, the project will aid the Government in defining conditions for borrowing and ownership of land and property by groups of smallholders, including water user groups and/or

	<p>parallel cooperatives. The project will promote provisions that high performance with regard to water or yields (excess water available under limit, or state orders of mandated crops fulfilled on less land than planned) would yield the privilege of freedom for individual smallholders or water user groups to farm cash crops separately. Reforms would also increase the availability of long-term land leases for farmers, thus removing the obstacles on technology adoption and access to financing.</p> <p>As noted above, low state-controlled prices for state-mandated crops provide very weak incentives for collective associations and smallholder farmers to innovate and invest in order to increase yields. Senior Daikhanbank officials note also that low profits also suppress lending in this sector, for lack of creditworthiness among potential borrowers. According to FAO, the farmers' income would be higher if they were paid at world market prices and received no subsidies⁴. The project will support the Government, Daikhanbank, and other stakeholders in analysis and policy development for reforms in the system of state-mandated crops, including price reform and possible shifts from direct purchases by the government to a combination of subsidies and insurance supported by expanded sales to private markets.</p> <p>Finally, there is an immediate need for development of detailed sublegislative acts and procedures for water metering and consumption-based billing, as mandated by the revised Water Code. The project will provide technical support to MAWR in designing effective and transparent water metering procedures in order to accelerate implementation. The capital costs will be co-financed by the GoT through the MAWR.</p>
<p>2.2. Background information on project/programme sponsor</p>	<p>The State Committee for Environmental Protection and Land Resources of Turkmenistan (SCEPLR) is responsible for development and implementation of national policy with regard to climate change mitigation and adaptation, climate monitoring, and management of land resources. SCEPLR is the government designated entity for coordination of activities, cooperation and interaction with UNFCCC (including reporting, preparation of the NCs, etc.), UNCCD and other environmental conventions. SCEPLR was appointed by the GoT as the national implementing partner for climate change adaptation projects financed by the GEF/SCCF and the Adaptation Fund and secured effective implementation of these projects so far. SCEPLR is the National Designated Authority for GCF.</p>
<p>2.3. Market Overview</p>	<p>See other sections for discussion of relevant market and institutional issues. A full market overview, including a discussion of various agricultural subsectors, will be included in the full project proposal.</p>
<p>2.4. Regulation, taxation and insurance</p>	<p>SCEPLR has full authority to implement all technical and policy-related aspects of the project. Daikhanbank is fully authorized to issue credit in agriculture. Details of specific arrangements for the use of GCF funds, including financial oversight and reporting, will be finalized during preparation of the full project proposal.</p>
<p>2.5. Implementation Arrangements</p>	<p>The project will be nationally implemented in line with the Standard Basic Assistance Agreement (SBAA, 1993), the UN Development Assistance Framework (UNDAF) agreed between the UN and the Government of Turkmenistan, and with the UNDP's Country Programme Document (CPD) approved by UNDP's Executive Board and Government of Turkmenistan.</p> <p>As an Accredited Entity to GCF, UNDP's overall role is to provide oversight and quality assurance through its Headquarter, Istanbul Regional Hub (IRH) and UNDP Country Office in Bishkek. This role includes: (i) project preparation oversight; (ii) project implementation oversight and supervision, including financial management; and (iii) project completion and evaluation oversight. It also includes oversight roles in relation to reporting and knowledge-management. A UNDP Programme Officer, or M&E Officer, at the Country Office with support from the UNDP's Global Environmental Finance Unit, will carry the Project Assurance role on behalf of UNDP. Throughout the lifetime of the project, the project assurance and execution roles of UNDP will be strictly separated.</p> <p>The State Committee for Environmental Protection and Land Resources is the government institution that will act as the Implementing Partner/Executing Agency. The State Committee will assume responsibility for the project implementation, and the timely and verifiable attainment of project objectives and outcomes. The State Committee will nominate a high level official who will serve as the National Project Director for the project implementation.</p> <p>The Ministry of Agriculture and Water Resources of Turkmenistan (MAWR) will be the key partner of the project and co-chair of the Project Board. MAWR's role in the framework of the</p>

⁴ FAO, Turkmenistan agricultural sector review, 2012.

project is fully in line with its leading institutional role in promoting innovation and sustainability in agriculture and water sectors.

For the purpose of directing the project, the **Project Executive Board** (PEB) will be established and serve as ultimate decision-maker and ensure that the project remains on course to deliver the desired outcomes of the required quality. A **Project Manager** will be recruited to ensure day-to-day management of the project. He or she will submit quarterly progress reports for the previous period and a work plan for the next one. Task Leaders would be hired by the project to manage specific component areas. Further details will be provided in the full proposal.

III. Financing / Cost Information

The Government of Turkmenistan is seeking GCF grant funding which - together with the government co-financing - will help outreaching and building climate resilience of the most vulnerable small holder farmers. There is a clear evidence from the past decade in Turkmenistan that the availability of cheap financial products by itself cannot transform the agricultural sector towards a greater resilience without addressing institutional, regulatory, information and knowledge barriers. Therefore, the GoT is requesting the GCF technical assistance grant to address barriers to scaled-up resilience and to unleash effectiveness of national loan schemes. GCF grant request constitutes approximately 13% of the total project funding. The table below presents an indicative allocation of the project budget by project activities.

3.1. Description of financial elements of the project / programme

Output	Activities	GCF (USD)	Co-financing (USD)
Output 1: Climate information, agrometeorology and extension services	Activity 1.1. Strengthening capacity of Hydromet to deliver tailored climate information and advisories for agricultural sector	\$2.3 mln	\$2 mln Daikhanbank \$12 mln GoT: Equipment and staff time of MAWR, SIWMD, and Hydromet, for consultation and field services to farmers
	Activity 1.2. Mainstreaming climate resilience advisory services through state-run and private extension networks	\$ 2.4 mln	
Output 2: Expanded access to climate-smart technology and irrigation systems	Activity 2.1. Mainstreaming climate resilience into state financial support for collective associations and small holder farmers for an accelerated wide-scale introduction of resilient farming technologies	\$5.5 mln	\$80 mln Daikhanbank loans for purchase or lease of qualifying farm machinery and irrigation equipment \$20 mln GoT grants and subsidies for the purchase and lease of machinery
	Activity 2.2. Scaled-up dissemination of laser-aided leveling	\$4.4 mln	
Output 3: National and sectoral policy, legislation and enforcement	Activity 3.1. Climate-proofing the national and sectoral planning	\$1.3 mln	\$4 mln GoT: staff time of MAWR and other agencies, and state budget allocations for

	Activity 3.2. Climate-smart provisions in Land and Water Codes and accompanying sublegislative acts	\$ 1.2 mln	implementing new reforms \$2 mln GoT state investment into water metering, reporting and enforcement
Project Management		\$1.9 mln	\$4.5 million
TOTAL		\$19 mln	\$124.5 million

Co-financing for the project will come from two major sources: the state budget for MAWR and other agencies, and Daikhanbank credit lines. It is estimated that total co-financing during the project period will exceed \$120 million. In addition, the GCF project will leverage private investment by farmers at the level of at least US\$20 million.

		Financial Instrument	Amount	Currency	Tenor	Indicative Pricing
3.2. Project Financing Information	Total Project Financing (a) = (b) + (c)		.....143.500.....	<u>million USD (\$)</u>		
	(b) Requested GCF Amount	(i) Senior Loans	.....	<u>million USD (\$)</u>	() years	() %
		(ii) Subordinated Loans	.....		( ) years	() %
		(iii) Equity	.....		( ) % IRR	
		(iv) Guarantees	.....		
		(v) Reimbursable grants *	.....		
		(vi) Grants *	19.000			
* Please provide detailed economic and financial justification in the case of grants.						
	Total Requested (i+ii+iii+iv+v+vi)	...19.000...	<u>million USD (\$)</u>			
(c) Co-financing	Financial Instrument	Amount	Currency	Name of Institution	Seniority	
	<u>Equity</u>	.....	<u>million USD (\$)</u>	Daikhanbank GoT: State budget allocations to MAWR, SIWMD, state hydrometeorology service, etc.		
	<u>Senior Loans</u>	...80.000				
	<u>Grant</u>	...44.500...				
<u>Grant</u>	.....				
Lead financing institution: Ministry of Agriculture and Water Resources, Daikhanbank						

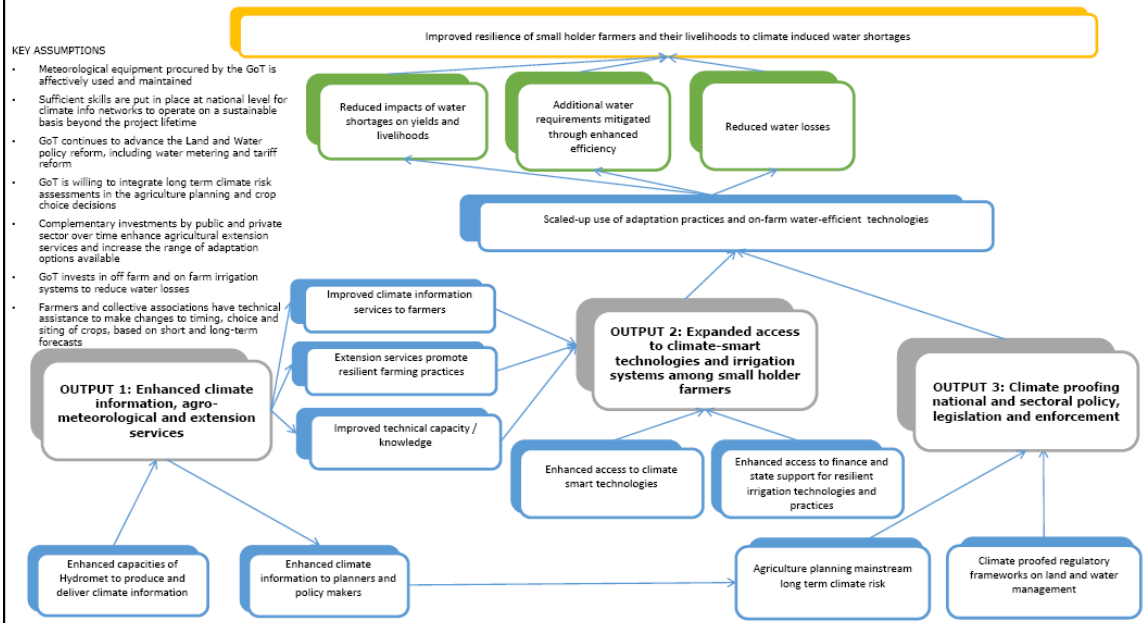
	(d) Covenants	
	(e) Conditions precedent to disbursement	

IV. Expected Performance against Investment Criteria

Please explain the potential of the Project/Programme to achieve the Fund's six investment criteria as listed below.

<p>4.1 Climate Impact Potential <i>[Potential to achieve the GCF's objectives and results]</i></p>	<p>The project will contribute to the GCF result areas on an increased resilience of most vulnerable people and communities, and an increased resilience of food and water security. These impacts will be achieved through enhancing efficiency of irrigation systems and on-farm water use within the strategic agricultural sectors in Turkmenistan. The GEF project will provide additional and incremental climate finance in support of the state budget investments in agriculture and water sectors in order to address the observed and increasing climate change driven water scarcity. The climate change outlook of Turkmenistan is presented in the Annex II.</p> <p>During the project period, the project will directly increase climate resilience and reduce the vulnerability of about 300,000 people dependent on agriculture. Improved water efficiency, soil management, and crop production systems will bring approximately 200,000 ha of agricultural lands directly under climate resilient technologies and practices, resulting in a real net household income increase of at least 15 percent for participating households (of which at least 20 percent are women-headed households).</p> <p>Replication of successful efficient water management and climate resilient agricultural practices via the enhanced national and sectoral policies and regulations, improved knowledge, raising of competitiveness, and cycling of state loan funds would further benefit around 1,000,000 persons (comprising 200,000 smallholder farms), or around 40 percent of the nation's population that is economically dependent on agriculture, slightly more than half of whom are women.</p>
<p>4.2 Paradigm Shift Potential <i>[Potential to catalyze impact beyond a one-off project or programme investment]</i></p>	<p>This project constitutes a very strong opportunity for paradigm shift within the strategically important sectors of the Turkmenistan economy and will contribute to enhanced food and water security at the national scale. The proposal is based on the analysis of underlying and structural causes of vulnerability of the agricultural sector to climate change and is designed as a complementary to GoT baseline development investments. The project is being developed in synergy with the national investment programmes implemented by the GoT addressing resilience of the agriculture and water sectors. The Government identified a number of barriers that hamper an effective implementation of these programmes, in particular, the outreach to the most vulnerable small holder farmers and to the most vulnerable sub-sectors – state-order crops. These subsectors have been and will remain strategically important for the GoT in the medium- to long-term due to their contribution to the food security and exports diversification. The GCF resources will help to remove the barriers and to enhance effectiveness of the GoT strategic investments at the national scale. At the same time the climate information and analysis to be supported by the project will contribute to and influence national long term strategic planning and decision-making within the agricultural sector and across economic sectors. The TOC diagram for the project is presented below.</p> <p>Contribution to the creation of an enabling environment, regulatory framework and policies</p> <p>The project will build upon the positive water policy development gains achieved under the UNDP-led project financed by the Adaptation Fund and will further support operationalization and enforcement of the new Water Code by developing technical regulations and guidance on water metering, collective water management, water pricing, etc.. The project will also address policy and regulatory gaps related to pricing of state-order crops, enhanced land tenure and management. In conjunction with the ongoing process of reform of the national Land Code, the project will create new regulatory enabling environment that encourages innovation and rewards climate-smart practices to conserve water and meliorate land. These reforms, combined with</p>

expanded access to state-subsidized Daikhanbank loans, will in turn create greater flows of capital to more of the most vulnerable citizens across the sector and across the country.



Potential for knowledge and learning

Technical and informational barriers also widely inhibit needed advances, because of the insufficient delivery of progressive extension services. The project will address these barriers by delivering enhanced extension services and agrometeorological monitoring and forecasting, with transition to eventual delivery of extension services by private local consultancies. Enhanced knowledge and learning on climate-smart agricultural practices will directly support the financial interventions of the project by ensuring that new equipment and irrigation infrastructure are operated and maintained correctly, thus increasing the likelihood of expanded yields and timely servicing of loans. The project's activities in support of enhanced agrometeorological modeling, forecasting, and information delivery will likewise remove known informational barriers and help shift the sector to new practices sustainable in the long term.

Potential for scaling up and replication

This integration of regulatory, financial, technical, and informational interventions will create new enabling conditions for innovation and entrepreneurship across the agricultural sector, while at the same time giving farmers and collective associations the financial and informational resources to make the most of this opportunity. The project will seek most of all to benefit the most vulnerable citizens – smallholders and their families – but will also promote climate-smart innovation at the level of the agricultural collective associations themselves.

Working at both the individual and collective association levels will enable the project to achieve scale in both the immediate term (before land and water reform) and the longer term (after land and water reform). And the approach will create sustainability as well, as eventually institutional arrangements, financing, and know-how become correctly aligned for entrepreneurship and innovation among smallholders and extension service providers alike. Under these new conditions, smallholder farmers will be able to adopt and sustain climate-smart practices, with stable yields leading to stable incomes, financial staying power, and self-renewing capacity to pursue opportunities for financing and advanced climate-smart practice even after the project ends.

4.3 Sustainable Development Potential [Potential to provide wider development co-benefits]

The project directly contributes to three Sustainable Development Goals (SDGs):

- * SDG 1 on poverty reduction;
- * SDG 2 on food security;
- * SDG 13 on climate action.

In addition, the GCF project will provide indirect contribution to three other SDGs:

- * SDG 5 through the contribution to gender equality and empowerment of women;
- * SDG 6 through contribution to monitoring and sustainable management of water resources;
- * SDG 15 through contribution to reduced land degradation and ecosystem loss.

	<p>Aside from the climate change adaptation benefits projected in Section 4.1 above, the project will also generate important co-benefits, including:</p> <ul style="list-style-type: none"> • Equitable distribution of economic and other benefits among women and men and enhanced participation of women in collective water management (WUGs) • Mitigation of potential food insecurity and dependence on food imports stemming from climate-induced reduction in agricultural yields. • Easing of tendency toward migration toward Turkmenistan’s cities, which themselves have growing sustainability concerns in transport, utility services, and other social services, reducing rural-to-urban migration from an estimated baseline of 20,000 citizens per year to less than 5,000. • Potential scaled-up energy savings from reduction of water volumes and related pumping energy, • Reduced need for new drainage infrastructure and related economic and environmental risks, as a result of more efficient application of water to fields • Accelerated development of indigenous manufacturing of irrigation equipment and other infrastructure, such as canal linings – estimated incremental economic growth in these areas of 10 percent beyond baseline • Preservation of traditional agricultural heritage, which is a vital element of Turkmen national identity
<p>4.4 Needs of Recipient <i>[Vulnerability to climate change and financing needs of the recipients]</i></p>	<p>Vulnerability to climate change</p> <p>As noted in Section 2.1, increased ambient temperatures and reduced precipitation will lead to reduced runoff from Turkmenistan’s source rivers, and in turn, to steeply reduced water availability. Deficits of up to 5.5 km³ per annum, or more than half of current annual water use in agriculture, are expected by 2050. Without comprehensive action to adapt to these conditions via increased water efficiency and more climate-resilient agricultural practice, this water deficit would result in an estimated overall decrease in productivity of irrigated agriculture in the range of 15-50 percent, or about 4 million tons of wheat and more than 3 million tons of cotton per year. Livestock productivity will drop due to dwindling areas of pasture land and a projected 30 percent decrease in fertility of existing pastures.</p> <p>These changes would result in serious direct damage to the already tenuous economic livelihoods of the half of Turkmenistan’s population that depends directly on agriculture – about 2.5 million citizens. The nation’s food security could also be threatened, affecting the entire population, especially the most economically vulnerable.</p> <p>Specifically, climate change in Turkmenistan is expected to cause the following detrimental effects:</p> <ol style="list-style-type: none"> 1. reduction in cultivable land area as a result of less available water resources; 2. increased demand for irrigation water due to increased transpiration (an expected increment of more than 13 percent); 3. declining quality of water resources as a result of growing salinity level; 4. increased salinization and decreased effectiveness of melioration of irrigated lands; 5. decreasing agricultural crop productivity; and 6. disruptions in the timing of plant development and growing seasons; and 7. decreased capacity to manage situations of particularly acute water stress <p>The project will address these vulnerabilities by removing financial, institutional, and informational barriers to innovation and climate-smart practices, thereby reducing water losses in irrigation, and in turn increasing the availability of water. The project will also increase overall agricultural productivity by ameliorating soil conditions, optimizing farm operations with regard to both the availability and effectiveness of equipment use, and improving management of grazing in desert pastures. It will achieve these goals by delivering extension services, by expanding their access to needed financing for technical upgrades, and by implementing supporting policy, research, and public outreach. Please see previous sections for in-depth discussion of the proposed activity and theory of change of the project.</p>

<p>4.5 Country Ownership <i>[Beneficiary country ownership of project or programme and capacity to implement the proposed activities]</i></p>	<p>Water management, as noted in previous sections, is an issue of fundamental importance for the country. More specifically, efficient irrigation, other water conservation efforts, and sustainable land management are defining mandates of several state programs, including the broad “Fundamental Directions of Economic, Political, and Cultural Development of Turkmenistan in the Period up to 2020” and National Program for the Social Development of Rural Areas. These priorities are reflected in significant budget allocations for water management, research and development, and investment in new infrastructure as well as in the most recent policy developments including the adoption of the new progressive Water Code.</p> <p>The current UN Development Assistance Framework (UNDAF) jointly signed by the UN and the Government also prominently cites the need for joint activity on integrated water management and mitigation of land degradation.</p> <p>Climate change adaptation is a national strategic priority, as articulated in the INDC, NCCS and the NEPAAM. The INDC clearly prioritizes adaptation action in agricultural and water management sectors. (See section on Baseline Activity in Section 2.1.)</p> <p>Country ownership and country-drivenness applies not only to the issues, but to the project itself. SCEPLR and MAWR have participated actively in all stages of development of this project. All preliminary technical justification of project plans originates from these agencies and the State Institute for Water Management Design.</p> <p>The SCEPLR and MAWR are committed to serving as lead implementing agencies of the project, while other national agencies also offer their support. Through its existing projects, UNDP has already engaged a wide range of local and national stakeholders, including agricultural collective associations and their members. For this new project, UNDP has also established a connection with Daikhanbank, which is ready to help define, co-finance and implement the project.</p>
<p>4.6 Effectiveness and Efficiency <i>[Economic and financial soundness and effectiveness of the proposed activities]</i></p>	<p>All aspects of the project will emphasize measures that not only conserve scarce resources, but also increase crop yields and thereby provide financial sustainability. Notably, a recent comparative analysis from SIWMD indicates that investment in water-saving irrigation, while it requires a significant initial capital outlay, obviates the need for new drainage, better preserves and ameliorates soil quality, and increases crop yields. Therefore capital-intensive low-water approaches – such as sprinkler irrigation - would have favorable rates of return for farmers while lowering long-term risks of land degradation and climate vulnerability. Other measures, such as coordination of scheduling and changing layout of irrigation channels, are expected to have very low costs. Economic analysis of individual water saving technologies and resilient land use practices piloted under the Adaptation Fund project is presented in the Annex III.</p> <p>Full analysis of cost-effectiveness, including projection of rates of return on GCF contributions, will be developed during preparation of the full project proposal.</p>

V. Brief Rationale for GCF Involvement and Exit Strategy

Baseline activities on agriculture, water management, and climate resilience in Turkmenistan have made important first steps in defining high-level mandates, and in demonstrating new technology and best practices in individual velayats. But scale-up requires truly national-level efforts to reach large numbers of smallholder farmers with technical know-how and capital. There is clear evidence from the past decade of agricultural development in Turkmenistan that without systematic removal of barriers, even the most attractive financial products and subsidy programmes cannot deliver scaled up transformation of the agricultural sector towards greater resilience. Hundreds of thousands of the most vulnerable smallholder farmers have not been reached by government investments into sustainability and innovation. Therefore, the GoT is requesting the GCF resources to address identified barriers to scaled-up resilience and to unleash effectiveness of national investments. GCF funding will expand access to financing, technical services and information for potentially thousands of small farmers.

For a discussion of post-project sustainability, see Section 4.2 above.

VI. Risk Analysis

Risk	Rating	Proposed mitigation approach
Farmers are so financially risk-averse, financially unsophisticated, or busy that they decline to borrow to procure needed equipment, even with additional support	Medium	Demonstration projects within the three existing UNDP projects have been documenting financial performance of specific types of investment. Promotion of success stories and training on financial record-keeping through an enhanced extension network should reduce farmers' doubts about benefits, and their apprehensions about added administrative burdens. Daikhanbank loan officers and agronomists will be also trained to facilitate analysis and investment decision by the borrowers.
Financial performance of loans widely falls short of levels needed for favorable rates of return	Low	The three existing UNDP projects, supplemented as needed with extra research specific to GCF project preparation, will test technologies and develop full technical and financial justification before the finalization of lists of technologies that qualify for preferred financing. The economic assessment produced by the Adaptation Fund project already presents a proof of cost effectiveness of the proposed measures (Annex III). In addition, the project intervention will result in the reduction of costs of these technologies for the end users through bulk procurement, economies of scale, stimulation of the local production (e.g. for drip irrigation systems), GCF- and state-supported leasing scheme, etc. (see Component 1).
Qualified providers of technical consultation and services are too scarce to cover needs in all five velayats in a timely way	Medium	National experts agree that there is no shortage of agronomists in the country, but there remains a risk that their geographic distribution, qualifications, and availability would limit the fulfillment of extension service needs in the country. The project will seek to mitigate the risk of personnel shortages by 1) delivering training to help expand the supply of qualified technical experts; 2) emphasizing mobile and electronic delivery of services; 3) engage with the local branches of Daikhanbank and 4) first emphasizing relatively simple, easily replicable practices such as scheduling and clearing of drainage channels, which do not require extensive site-specific system design.
The continued availability of free irrigation water and the absence of conservation incentives suppresses farmers' incentives to adopt new technology and practices	Low	The Government is acutely aware of water shortages. The new Water Code already included early provisions for water tariffs and water metering. The project (component 3) will support further development of technical regulations, guidance and enforcement related to the water tariffs, water metering, enforcement instruments. In any case, the financial incentive to adopt new technology and practices would most likely continue to lie with the potential for greater crop yields, not savings of water expenses, even if tariffs were introduced.

VII. Multi-Stakeholder Engagement

UNDP has already actively engaged multiple stakeholders – including MAWR, SIWMD, and numerous agricultural collective associations – in its three existing projects. For this new project submittal to GCF, UNDP has again engaged these parties, as well as Daikhanbank and the Union of Industrialists and Entrepreneurs. During full project preparation, UNDP will conduct regular direct meetings with these entities and will rely on them for background information, project formulation, and review of drafts, as well as formal expressions of co-financing commitments. As noted above, these and other stakeholders will also remain engaged directly with the project as members of the Project Steering Committee.

The State Committee of Environmental Protection and Land Resources of Turkmenistan, as the National Designated Authority, will itself consult with MAWR and other relevant stakeholders before issuing a Letter of No Objection to accompany the full proposal.

VIII. Status of Project/Programme

- 1) A pre-feasibility study is expected to be completed at this stage. Please provide the report in Annex II.
See Annexes II and III
- 2) Please indicate whether a feasibility study and/or environmental and social impact assessment has been conducted for the proposed project/programme: Yes No
(If 'Yes', please provide them in Annex II.)

A full feasibility study and environmental and social impact assessment will be completed during preparation of the full project proposal.

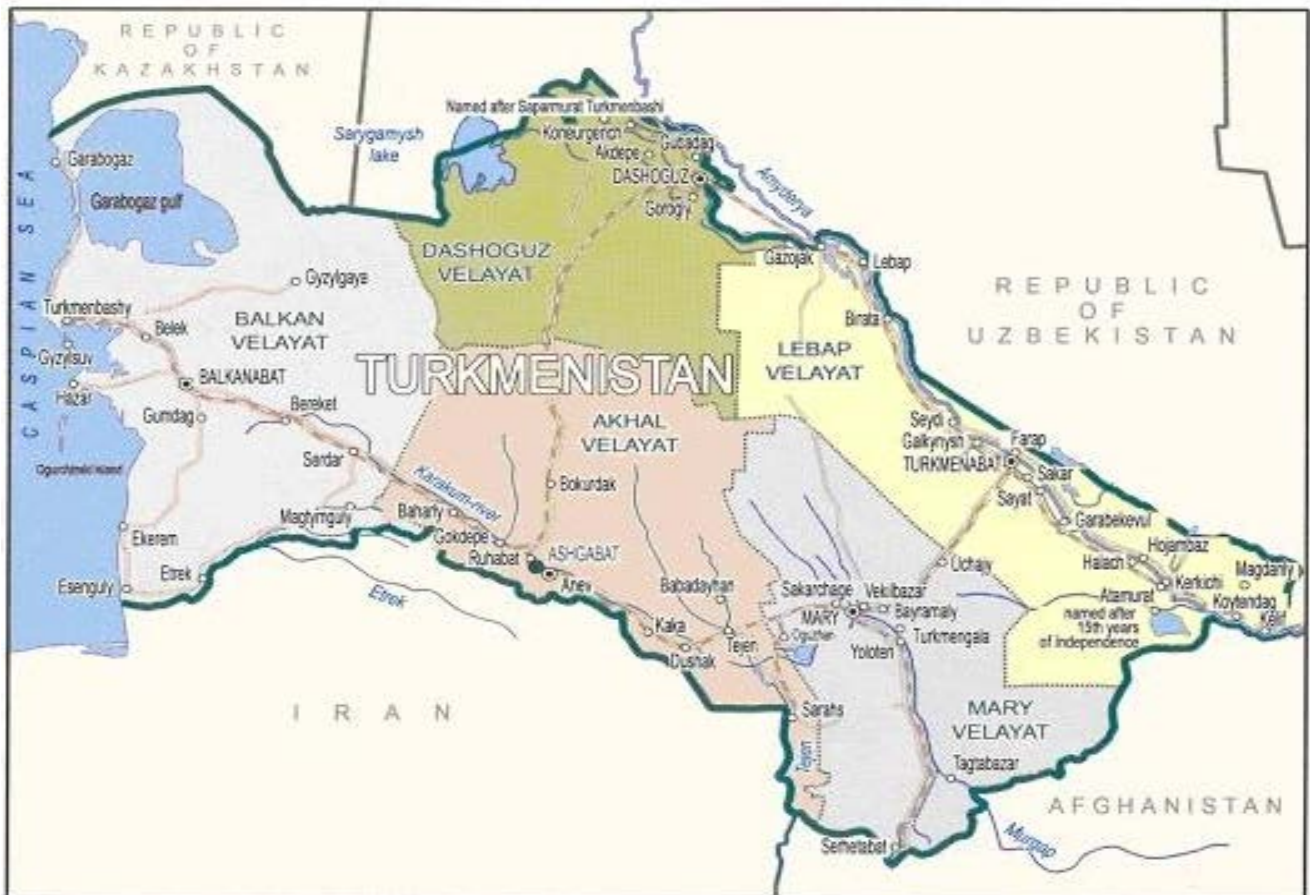
- 3) Will the proposed project/programme be developed as an extension of a previous project (e.g. subsequent phase), or based on a previous project/programme (e.g. scale up or replication)? Yes No
(If yes, please provide an evaluation report of the previous project in Annex II, if available.)

See Section 2.1 for a discussion of existing UNDP projects whose work will be replicated in the new GCF-funded project. Evaluation report for the key baseline project will be available in September 2017.

IX. Remarks

Annex I.

Map of the project territory:
Administrative regions (velayats) of Turkmenistan



Annex II.

Turkmenistan climate outlook and vulnerability to climate change

Turkmenistan is located in the west of Central Asia between the Caspian Sea and the Amu Darya River. The territory of Turkmenistan is a part of the Aral and Caspian Sea basin. It is predominantly a flat country containing deserts and oases, with mountainous zones along its border (mainly in the south). The Karakum Desert, one of the largest deserts in the world, occupies 80% of the country's total land area. The rest of the land area is covered by mountain. Turkmenistan has a sharply continental and extremely dry and hot climate.⁵ Despite the desert nature that is distinctive for most of Turkmenistan, there are significant differences in average temperature in the northern and southern parts of the country. The northern part, located in the Siberian anticyclone area, is characterized by severe and long winters with continuous snow cover and average yearly temperatures fluctuating between 13°C and 16°C. The southern part of the country, on the other hand, is characterized by mild winters with only occasional snow cover and average yearly temperatures ranging between 18°C and 22°C.⁶ In the warm period of the year (from May to September), the daily air temperature often exceeds 40°C, and has occasionally even surpassed 50°C (in Repetek, southeast Karakum Desert). Meanwhile, during the coldest part of the year, temperatures are usually below zero °C and have even been recorded at levels as low as -36°C⁷ (in Dashoguz velayat).⁸ In terms of the historical trends related to the average mean temperature, meteorological data series show a steady increase of 1.4°C since the 1960s.⁹

The annual precipitation across Turkmenistan also varies greatly, ranging from 76 mm to 380 mm. In the northern part of the country, most of the precipitation occurs in the periods from March to May and from October to February, with the summer months experiencing quite low levels of precipitation, accounting for only 8.4 % of the total annual amount.¹⁰ In the southern parts of Turkmenistan, much of the precipitation falls between December and April (87.8 % of the total annual amount), with quite low levels seen during the summer months (only 1.9 % of the total amount). In addition, while the desert areas experience precipitation only in the winter, the mountainous areas are characterized by a high frequency of precipitation throughout the year, often causing flash floods and mudflows.¹¹ Trends show that variability in monthly precipitation has been growing and that the amount of precipitation during recent years has slightly increased, particularly in spring months, with the lowest precipitation values being observed in summer.¹² With the low total annual rainfall, 96% of Turkmenistan is characterized as arid land, making it the most arid of the five Central Asian countries. Drought is a semi-permanent condition in the country. There are few rivers, the largest being Amu-Darya, with little to no surface flows across most of the desert landscapes. Water is a scarce resource and is unequally distributed across Turkmenistan, with 95% coming from the Amu Darya river, and the remaining 5% from all other rivers, streams and springs. The southern Murghab, Tedzhen and Sumbar rivers, and the smaller rivers of the foothills of the Kopet Dag, are fully exploited for irrigation. The building of the Karakum Canal has changed the distribution of water resources across the country. It has removed the imbalance in the distribution of water between the larger areas of cotton growing land in one part of the country and the water resources in the other. Water shortages are common, particularly in the south and west of the country.

Over the past 55 years, intensive warming has been observed all over the country. The highest temperature rise, 2°C, is observed in the winter period. Overall, the climate is becoming drier with increased frequency of strong heat periods; flash runoffs and mudflows as well as rainstorms. In addition, the productivity of pastures and grazing sites which is closely linked to the changing weather conditions has been severely affected, with the dry years experiencing a reduction of the volume of forage by 3 - 5 times. Since 1969, the Amu Darya River basin has been repeatedly affected by seasonal floods, causing damage to farmlands, homes, public utilities and infrastructure.

⁵ Second National Communication of Turkmenistan to the United Nations Framework Convention on Climate Change (UNFCCC), 2010.

⁶ Ibid.

⁷ Ibid

⁸ velayat refers to province.

⁹ Turkmenistan Climate Adaptation Profile, Climate Change Knowledge Portal.
http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile&CCCode=TKM.

¹⁰ Second National Communication of Turkmenistan to the UNFCCC.

¹¹ Ibid.

¹² Turkmenistan Climate Adaptation Profile, Climate Change Knowledge Portal.
http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile&CCCode=TKM.

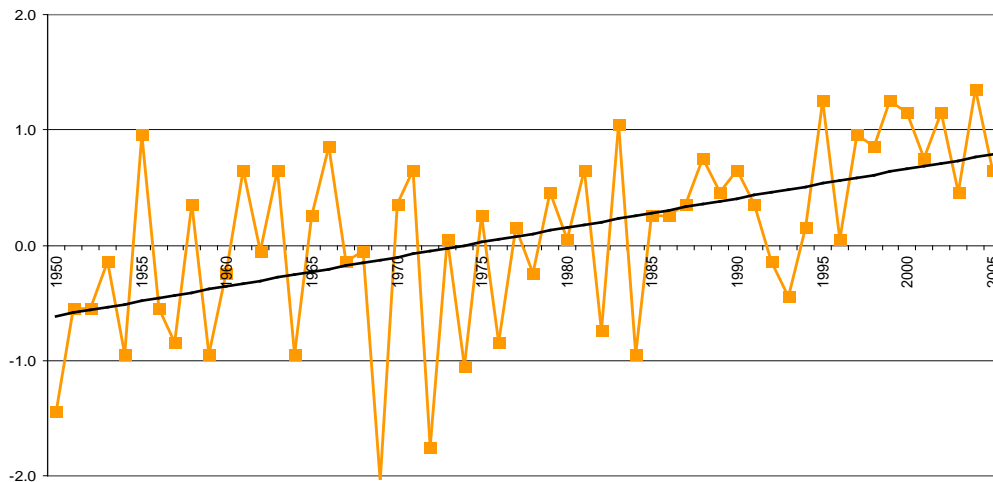


Fig. 1: Mean annual change in air temperatures (temperature deviation from average indicators recorded 1961 – 1990). Source: Ministry of Nature Protection

Climate change modeling indicates significant increases in temperature (Figure 2) and reductions in rainfall (Figure 3).

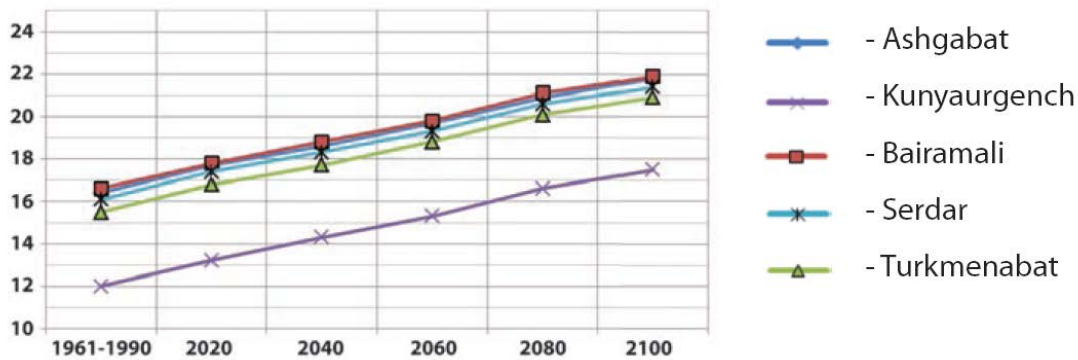


Fig. 2: The average annual air temperature for averaging scenario, °C, TNC, 2016

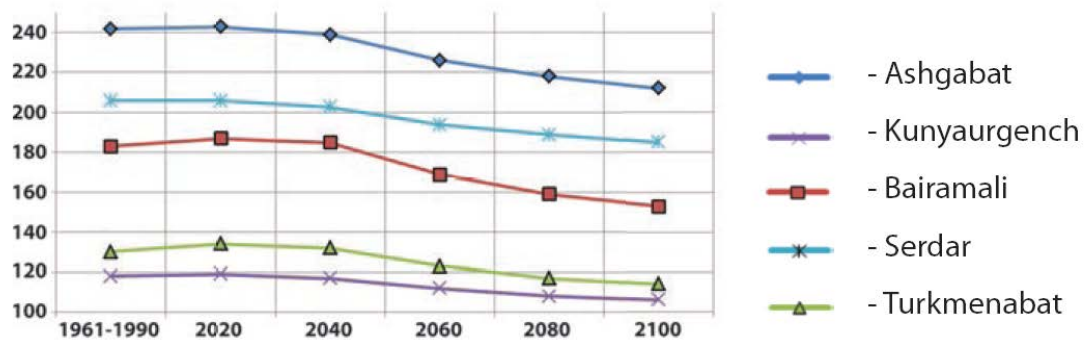


Fig. 3: The average amount of precipitation on averaged scenario, mm, TNC, 2016

Temperatures are expected to increase steadily in 2020-2100, and the amount of precipitation at first remains stable, fell sharply after 2030-2040 by up-to 22 mm by 2100. The air temperature on the averaged scenario will increase by 2020 by 1.23°C, 2040 – by 2.21°C, 2060 – by 3.22°C, 2080 – by 4.51°C, 2100 – by 5.35°C. The runoff of Amu Darya river (the main source of Turkmenistan’s surface water) is expected to decline by 10-15 percent by 2050¹³.

¹³ Third National Communication of Turkmenistan to the UNFCCC (2016)

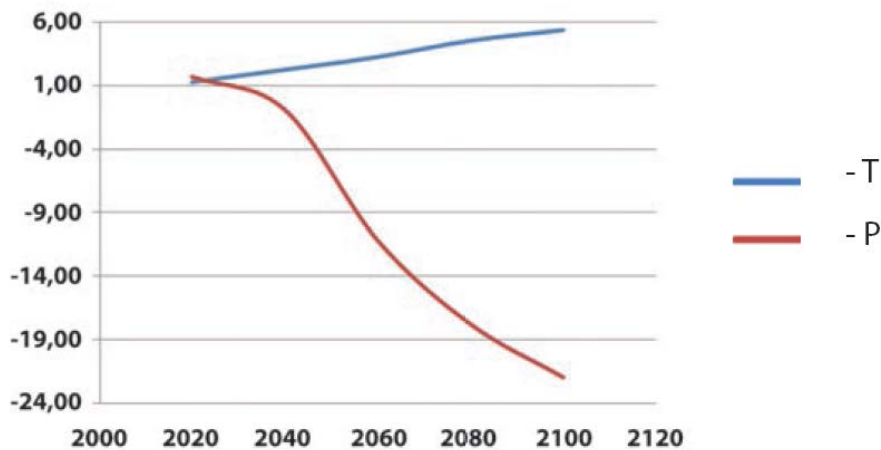


Fig. 4: Deviation from the normal average air temperature T (°C) and precipitation P (mm) for Turkmenistan on averaged scenarios A1FI and B1, TNC

In summary, predicted climate change impacts in Turkmenistan are project to include the following:

- An increase in average annual temperature, which will include an increase in the number of extremely hot days (i.e. days over 40°C)¹⁴;
- A reduction in annual average rainfall;
- An increase in average regional evaporation rates of 48% by 2050;
- An increase in the frequency and intensity of drought and flood spells;
- A 10-15% reduction in flow rates for the Amu Darya river¹⁵; and
- A 30% reduction in flow rates of other rivers.

According to national estimates, unless there is an improved efficiency in irrigation systems, these factors are likely to result in a water deficit for agriculture of up to 5.5 km³ per annum by 2050¹⁶. This is equivalent to approximately 20% of current water use in the agriculture sector. This water deficit has the potential to result in significant economic losses to the agriculture sector. Due to unproductive land equivalencies, over the period 2015-2030, this water deficit would result in output reductions equivalent to nearly 4 million tons of wheat and more than 3 million tons of cotton. An estimated overall decrease in productivity of irrigated agriculture will be in the range of 15-50%¹⁷. The livestock productivity will drop due to dwindling areas of pasture land and a 30% decrease in fertility of the existing pastures¹⁸. Climate change is therefore likely to reduce the volume of water availability for irrigation, and subsequent limit the amount of crops produced. These trends will be accompanied by increased frequency and severity of climate induced disasters (drought, floods, strong winds).

Vulnerability of the Turkmenistan agricultural sector and communities

Despite the fact that only 4.1% of the land area is arable¹⁹ and the challenging conditions, agriculture remains a key strategic sector of the economy, employing approximately 50% of the workforce and contributing 19% of Gross Domestic Product (GDP)²⁰ (USD \$3.8 billion). Agriculture is the basis for the country's food security and an important supplier of raw materials for the processing industry. Livestock, wheat and cotton are the primary areas of economic activity. Pastures occupy a large territory of the country accounting for 78 percent of land reserves. Approximately 47.77% of Turkmenistan's

¹⁴ These estimates are based on the findings of five general atmosphere and ocean circulation models (GCM) reported in Turkmenistan's Initial Communication on Climate Change (1998). The GCM with the most plausible results on temperature predictions was the UK89 model (equilibrium model of the United Kingdom Meteorological Agency). According to this scenario, temperature is predicted to increase by 5.5°C by 2050.

¹⁵ Second National Communication of Turkmenistan to the UNFCCC (2010)

¹⁶ Third National Communication of Turkmenistan to the UNFCCC (2016)

¹⁷ CAREC, Gap Analysis on Adaptation to Climate Change in Central Asia

¹⁸ CAREC, *ibid*

¹⁹ World Bank, data.worldbank.org>indicators

²⁰ FAO, Turkmenistan Agriculture Sector Review (2012)

population lives in rural areas and depend on agriculture for their livelihoods; with a significant part of rural population being particularly vulnerable due to a combination of socio-economic factors and climate change impacts. As agriculture is one of the most climate sensitive sectors, climate change will likely affect most vulnerable rural populations and have negative consequences on economic growth and their livelihoods.

During the last few decades, Turkmenistan has experienced widespread changes in land cover and land use following the socioeconomic and institutional changes in the wake of the disintegration of the Union of Soviet Socialist Republics (USSR) in 1991, and subsequently followed by a decade of drought and steadily increasing temperatures. These changes in the vegetated landscape are sufficiently broad to be detectable from orbital sensors at multiple scales. The agriculture sector in Turkmenistan is not currently at its maximum productive potential.

As a result of limited water resources, of the 17 million hectares available for irrigated agriculture, only 1.7 million are currently utilized for this purpose. Despite this, agriculture currently consumes 92% of all available surface waters in the country. Since agriculture is heavily dependent on irrigation, increasing temperature, a decrease in precipitation, and the probable reduction in surface water are all likely to potentially lead to an increase in aridity and accelerating desertification. Due to expected water scarcity, a decrease and degradation of natural grasslands is also anticipated, ultimately leading to a decline in sheep breeding production²¹.

The Crops subsector: The focus of the sector is largely on state mandated crops such as cotton, wheat and sugar beet. Consequently, almost all public sector investments are directed at cotton and wheat, based on government policy of self-sufficiency in grains and maintaining the export potential for cotton products. This policy has greatly affected the structure of the agricultural sector and its potential for production, since thousands of hectares of land that were under orchards, horticulture and fodder crops have been diverted to production of winter wheat. In recent years, the Government has begun to recognize the need to diversify the agricultural sector and acknowledges the inefficiencies of enforcing cotton and wheat production in all regions of the country, however, this effort has been constrained by the increasing frequency of drought in agricultural producing regions, and the associated economic losses experienced by the state. The state has in recent years, allocated some land for crops other than the government mandated crops to be grown in each of the five provinces based on soil and climatic conditions in these regions. As a result of this, each province has been allocated land on a leasehold basis for growing maize, barley, lucerne and other forage crops, a practice aimed at promoting crop rotation and thus improving soil quality. The government is also beginning to invest in high efficiency irrigation technology for water intensive crops, to include (subsoil) drip irrigation systems, mobile sprinklers and wastewater drainage and recycling.

The Livestock subsector is dominated by the private sector, with more than 80% of all products produced by private farmers following the decommissioning of Soviet state livestock farms. Private rural households operate on a lease agreement, according to which the leaseholder provides feed and veterinary services and makes sure that the livestock is kept in good condition. Based on the lease agreement the leaseholder is allocated land for growing fodder crops and receives all the livestock products produced and half of the offspring during the lease period. This lease arrangement predominantly applies to the lease of cattle, whereas sheep and goat are mainly kept by the state association themselves due to relatively easier husbandry and production conditions. Despite a lack of state investment, livestock management has managed to develop a certain degree of efficiency and productivity, and this subsector now provides a good model for further private sector development within the agricultural sector.

A special attention in the context of climate change should be paid to the vulnerability of natural pastures. The natural pastures have a large diversity of vegetation species and low cost maintenance with a high nutritional value. However, the pastures are of low productivity and increasingly vulnerable to a sharp seasonal and annual variability. The natural pastures as a reserve base for forage and its nutritional value vary considerably throughout the year. From summer to winter the feed volumes of the pastures are decreasing by 2.0-2.5 times. Assessment of climate change and its impact on the grasslands have shown that productivity is likely to decline in the future. Despite a sufficient resistance of plants to drought and heat, it has been observed that when drought occurs over an extended period that there is a decline in grassland productivity. Soil drought caused by decrease in the water reserve in the soil up to 4 mm. An assessment of accumulated annual precipitation and moisture deficit show

²¹Second national communication of Turkmenistan to the UNFCCC

that climate change-induced grassland productivity may decline to 10–15% reflecting a moisture stock decrease in the soil in the 0-20 cm layer. The reduction in pasture productivity would likely result in decreased livestock productivity resulting in reduction in meat and wool production²².

The Fruit and Vegetable subsector is the most independent of the agricultural sector in Turkmenistan with almost 100% of production is generated privately both by independent farmers and leaseholders. The total land area that is used for production of small-scale farming is negligible compared to the grain, cotton or livestock subsectors, but nevertheless it is highly productive and the most economically viable within the country's agricultural sector. Climatic conditions have historically allowed the country to produce high quality fruit and vegetable products and prior to collapse of the Soviet Union, Turkmenistan was a major exporter of fruit and vegetables to northern parts of the Soviet Union. Over recent years, land allocated to produce winter wheat was increased almost five times largely at the expense of areas dedicated to feed, fruit and vegetable crops. Prices and availability fluctuate between seasons, reflecting an undeveloped processing sector and lack of appropriate technology, facilities and infrastructure for cool storage. Despite the emergence of some private sector activity, this remains a key area for development, and demand for locally sourced product in the markets remains strong.

At present, favorable climatic conditions of Turkmenistan enable it to grow cotton, cereals, vegetable, fruits, grapes, forage crops almost over all the territory of Turkmenistan, and subtropical crops such as olives, pomegranates, persimmons, etc., in the south-west. Projected climate change in Turkmenistan is expected to directly affect the following: (i) Irrigation water demand due to transpiration intensity; (ii) Irrigated land reclamation; (iii) Agricultural crop yields; and (iv) Growing period of plants. In order to determine climate change impact on key agricultural production indicators in the main agricultural regions of Turkmenistan, three natural climatic zones – the Kopetdag and Murgab, the downstream Amudarya and the middle-stream Amudarya were studied. The calculations have been made for major agricultural crops – cotton, wheat, lucerne, and vegetables taking into account their yield capacity. Data analysis showed that crop water demand is likely to increase by 2020 by 13%²³. This is further compounded by the fact that Turkmenistan is a water-stressed country and has one of the harshest climates in the Central Asian region. The main causes of baseline water stress are: periodic low water flows in rivers, low efficiency of irrigation system, low performing irrigation techniques, limited effective water conservation mechanisms, and limited available water resources for the further economic development of irrigated agriculture.

One of the key underlying causes for baseline vulnerability of the agricultural sector in Turkmenistan is the inefficient water consumption due to outdated approaches to managing water, deteriorating irrigation infrastructure and subsidized water prices. The water subsidies make the current water system financially unsustainable, and dampen the private sector to invest in the absence of conducive financial mechanisms and economic instruments. As a result, incentives for efficient use of water are largely absent, thus large farmers use water inefficiently, and the quality of local service delivery for smaller farmers suffers. Despite inherent water scarcity, Turkmenistan has among the highest water consumption per capita in the world. However, the high water consumption levels are largely related to the inefficient irrigation systems in the country, as opposed to high household consumption. Farmers in Turkmenistan are not well prepared for climate change, particularly in relation to the efficient use of water. They are often unaware of water saving options. The vulnerability of the water sector to climate change processes directly affects water runoffs, alters rivers hydrographs, and reduces the overall quality of water. Thus, the intensive development of irrigated agriculture with the background decrease of water availability requires taking specific actions for sustainable and rational use of water resources.

To conclude, agriculture in Turkmenistan is extremely vulnerable to climate change, mainly connected to availability and quality of water and land resources. Given that agriculture is almost entirely based on irrigated agriculture practices, any reduction of the volume of available water resources would mainly take its toll on this sector. Effects could be the following: (i) less cultivable land as a result of less available water resources; (ii) increased demand for irrigation water (due to the increase of transpiration); (iii) declining quality of water resources as a result of growing salinity level; (iv) decreasing ameliorative conditions of irrigated lands; (v) decreasing agricultural crops productivity; and (vi) fluctuations in the vegetation periods for plants, etc.

²² Second National Communication of Turkmenistan under UNFCCC, 2010

²³ Second National Communication of Turkmenistan under UNFCCC, 2010

Annex III. Feasibility Study

Socio-economic assessment of adaptation measures in the context
of climate change and increasing water scarcity
(provided in a separate file)