

United Nations Development Programme
Country: TURKMENISTAN
Project Document

Project Title:	Addressing climate change risks to farming systems in Turkmenistan at national and community level
UNDAF Outcome(s):	3. By 2015, the system of environmentally sustainable economic management expands people's opportunities to participate in social and economic development, especially in rural areas
Expected CP Outcome(s):	3.2 Outcome: Environmentally sustainable use of natural resources contributes to effectiveness of economic processes and increased quality of life
Expected Output(s):	Output 3.2.2: Local communities contribute to and benefit from sustainable use of natural resources
Implementing Partner:	Ministry of Nature Protection of Turkmenistan
Responsible Parties:	UNDP, Ministry of Agriculture, Ministry of Water Economy, Local Authorities, Local Communities

Brief Description

The proposed project aims to overcome the above barriers to addressing immediate and long term adaptation needs in the water sector in Turkmenistan in order to achieve greater water efficiency and productivity under climate change induced aridification. The project will therefore aim to strengthen water management practices at national and local levels in response to climate change induced water scarcity risks to local farming systems in Turkmenistan. The project takes a comprehensive approach towards achieving this objective by encompassing national level water policy and local community level action to improve water efficiency and supply services.

Programme Period:	<u>Country Programme 2010-2015</u>
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Management Arrangements	<u>NIM</u>

Total allocated resources:	<u>USD 2,929,500</u>
• Regular	
• Other:	Adaptation Fund USD 2,929,500



Agreed by: _____

Ministry of Nature Protection of Turkmenistan

Date:

08 12 11

Agreed by: _____



UNDP in Turkmenistan

Date:

08 12 11

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I. SITUATION ANALYSIS

Introduction

Climate change is projected to have significant impacts on water resources in an already arid Turkmenistan. Water availability and supply are likely to suffer from increasing shortages due to elevated temperatures, overall climate aridification and competition for water arising from regional trans-boundary water issues. Turkmenistan's inherent aridity and reliance on agriculture as a source of both income and food renders the country particularly vulnerable to these climate change impacts.

In response, the Government of Turkmenistan is proposing to take a comprehensive approach to water adaptation in the agricultural sector. This initiative, which seeks financing through the Adaptation Fund, aims to increase resilience in 3 different agro-climatic zones in Turkmenistan by implementing hard water efficiency and irrigation measures, and to develop water user associations benefiting over 30,000 farmers. These communities are among the most vulnerable and water stressed, and for the most part lack access to state subsidy or support. To ensure that the beneficial impacts of the project can be replicated among other communities, the project will also seek to internalize climate change risks into water policies at the national level by establishing price incentives, technologies and management systems to achieve greater water use efficiency. It focuses on increasing the resilience of water resources for the most vulnerable and water-stressed communities, who are engaged in non-state agriculture, horticulture and livestock management and who are unlikely to benefit from Government's large scale water supply and storage infrastructure. The programme contributes directly to the AF's portfolio level objective "to increase adaptive capacity to respond to the impacts of climate change, including variability at local and national level".

Current State of the Agricultural Sector

The agriculture sector of Turkmenistan is hugely capital and labor intensive. Despite the purchase of large scale agricultural machinery, the sector remains relatively unproductive. The agricultural industry is mainly owned and controlled by the state, with a few private producers and farm businesses starting to emerge in livestock, agricultural and processing sectors over the last decade. The main crops mandated by the state are cotton and wheat, as well as smaller amounts of rice and sugar beet. Almost all public investment is directed to production of these two strategic crops, based on an economic 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 under orchards, horticulture and fodder crops have been diverted to production of winter wheat.

Over recent years, the Government has begun to recognize the need to diversify the agricultural sector. This process has been driven by increasing frequency of drought in agricultural producing regions, and the associated economic losses experienced by the state. For the growing season of 2010 the state has allocated some land for crops other than state or government mandated crops to be grown in each of the five provinces based on soil-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 waste water 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 goats are mainly kept by the state association itself 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.

The *Fruit and Vegetable* subsector is the most independent of the agricultural sector in Turkmenistan with almost 100% of production 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.

Climate change impacts:

Meteorological drought is a semi-permanent condition in Turkmenistan. The country receives on average only 191 mm of precipitation per year. The country is therefore inherently water scarce, characterized by a continental and very dry climate, with low levels of precipitation and moisture (35% on average). Turkmenistan is a predominantly arid country with over 80% of its territory characterized by desert and oases, with mountainous zones¹ primarily along its southern borders. Water shortages and periods of drought are common, a situation which is likely to be exacerbated by climate change with consequences for development, economic growth and livelihoods. Almost half of the population is employed in the agriculture sector, and approximately 55% reside in rural areas.

Climate observations show that the air temperature is steadily increasing in Turkmenistan as in the whole of Central Asia. Precipitation will become more variable, with increased frequency and intensity of drought and flood spells. Glacial retreat in Pamir-Altai will have significant impacts on water flows of the Amu Darya River². As a result, significant decreases in water supply and agricultural production are expected. It is estimated that 30% of glaciers feeding the waters of Turkmenistan have already been lost during the past century, as a result of global warming. This is particularly alarming for the country whose water runoff formation is fully dependent on natural flow from glaciers. A trans-boundary river, the Amu Darya is the main source of irrigation for a number of countries in the region including Uzbekistan. The planned development of upstream hydro-electric projects in Tajikistan threatens the potential stability of downstream flows. The expected 15% reduction in flow of the Amu Darya by 2030 will have dramatic impacts on agriculture and food production in Turkmenistan. Other river flow rates are expected to decline at even faster rates (up to 30% reduction). At present, agriculture consumes 92% of all surface waters available in the country (2% - communal and 6% - industry). The situation becomes even more critical with the anticipated impacts of climate change, which will be characterized by increasing temperatures and evapotranspiration rates and decreasing precipitation levels. As a result, the average reduction in run off rates in terms of surface water collected in national storage and distribution systems is expected to be 10%, whereas during vegetation periods the reduction in run off rates will reach 30-40%.

In summary, predicted climate change impacts include:

¹ Several of the mountain ranges reach a height of more than 3000 m above sea level.

² The First National Communication to UNFCCC, Turkmenistan, 1998

- An increase in average annual temperature of between 4.2 and 6.1°C by 2050³, which will include an increase in the number of extremely hot days (i.e. days over 40°C);
- A reduction in annual average rainfall of between 15 and 56% by 2050⁴;
- An increase in average regional evaporation rates of 48% by 2050⁵;
- An increase in the frequency and intensity of drought and flood⁵ spellsⁱⁱ
- A 15% reduction in flow rates for the Amu Darya.
- A 30% reduction in flow rates for other river systems

In the context of the above additional pressures, the following are critical underlying causes of vulnerability:

(i) Deteriorating irrigation infrastructure and subsidized water prices. The availability of water in Turkmenistan is already constraining development and will do so even further in the face of climate change. In fact, water consumption per capita in Turkmenistan is more than twice that of any other country in Central Asiaⁱⁱⁱ. However, the high water consumption levels are largely related to the inefficiency of irrigation systems in the country, as opposed to high household consumption. Indeed, some 28% of Turkmen are without access to potable water sources^{iv}.

Tariffs are set by the government on a below cost recovery basis. This is done primarily to mitigate the social impacts of market pricing, and to ensure that those populations with a relatively modest income base are not disadvantaged. Such an approach makes the current water systems financially unsustainable and as such, this dampens the interest of the private sector to invest in the absence of compensatory financial mechanisms and economic instruments. As a result, incentives for water efficiency are largely absent, thus large farmers use water inefficiently, and the quality of local service delivery for small holders suffers.

(ii) Allocation of water resources to irrigate intensive cash crops due to historical reasons related to the Soviet period. The agricultural sector is the main consumer of water within Turkmenistan. Agriculture is a critical sector of the economy accounting for almost one-fifth of GDP and is a source of livelihood for half of the population. Turkmenistan took an initial step in 1997-1998 in changing the status of most farmers to "lease-holders." However, in practice, the rural economy continues to operate primarily under state control, with the government controlling both inputs and providing a market for produce for strategic crops (cotton, wheat, rice, and sugar beet). Virtually all cotton and wheat crops are grown under the system of state mandate and procured by the state at below-market prices. Some initial positive steps to initiate reforms of this system for cotton have been recently taken by the government. To improve the productivity of these crops, the government provides some incentives⁶ to farmers. These incentives are mainly provided to commercial farmers (who are involved in the large-scale production of wheat, cotton or rice). Thus, the current water policies burden the state budget. At the same time, farmers involved in large scale production of water intensive crop varieties do not receive adequate price signals to use water more efficiently. Given the increasing water shortages and priorities assigned to cash crop production the small holder subsistence farmers bear a disproportionate burden of intensifying water deficits.

The government is also concerned with rising water deficits. In this regard, the importance of rural development and social sectors has been underscored by the current government, and it has recently

³ 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.

⁴ The GDFL model scenario (equilibrium model of Geophysical Fluid Dynamics Laboratory, University of Princeton, USA), however, predicted no change in rainfall (Turkmenistan's Initial National Communication on Climate Change, 1998).

⁵ Floods are uncommon in Turkmenistan but they do still pose a threat to communities and infrastructure (see: <http://www.preventionweb.net/english/countries/statistics/risk.php?cid=178>).

⁶ For example, farmers only have to pay 50% of the cost of inputs such as fertilizers, seeds and equipment if they are farming wheat, cotton or rice on a large scale (Ministry of Agriculture, 14 October 2009.).

pledged significant resources⁷ toward these priorities. A recent assessment of Investment and Financial Flows (I&FF) for government adaptation activities in the water sector identified critical measures such as the introduction of economic instruments and financial mechanisms to make more water sector services self-sustaining under a changing climatic baseline. However, such instruments/mechanisms need to be carefully designed and applied. The assessment also identified the need for fundamental capacity development in key institutions in this critical sector. In addition, further recommendations suggested reaching out to the most vulnerable communities in various agro-ecological zones to tailor and implement local adaptation measures that improve access to water and promote livelihood resilience. The AF financed project proposed here seeks to implement such priorities as identified and prioritized by government.

The following are key policy, institutional and knowledge related barriers to addressing immediate and long term adaptation needs in the water sector in Turkmenistan.

- a. Despite water scarcity and a chronic resource deficit⁸ there are limited administrative or incentive measures for water saving and efficiency; moreover, in a current push to deliver commitments under state plans, farmers are forced to plant more crops and use irrigation water excessively.
- b. The water code adopted in 2004 is outdated and needs to be revised to allow for a more progressive water governance system to emerge. While current laws are enforced at different administrative levels, they do not clearly define the roles of local associations, nor have they provided any incentives for strengthening local water user associations. Water pricing policies do not capture the real price of water to major water consumers.
- c. Climate and socio-economic data are not systematically recorded or processed to underpin more informed decision-making on water allocations, technologies and management. Moreover, there is limited knowledge of tools and methods for socio-economic impact assessments and prospective planning techniques to allow for cost-effective adjustments and better preparedness of water and other vulnerable sectors to anticipated climate change risks.
- d. Local rural communities of the mountainous parts of Turkmenistan, oasis and desert systems have limited access to communal services (through associations, etc.) that grant uninterrupted water delivery. Community water delivery systems require more locally tailored approaches to address mounting pressures from climate change.

The proposed project aims to overcome the above barriers in order to achieve greater water efficiency and productivity under climate change induced aridification. The project will therefore aim to strengthen water management practices at national and local levels in response to climate change induced water scarcity risks to local farming systems in Turkmenistan. The project takes a comprehensive approach towards achieving this objective by encompassing national level water policy and local community level action to improve water efficiency and supply services.

The government of Turkmenistan has come to realise that water is one of the key driving forces for its economic development, and under conditions of increasing scarcity water infrastructure needs to be upgraded to minimise losses to the system. The government therefore has dedicated significant budget allocations for technological upgrades in water infrastructure. Currently, this is primarily related to improving supply side delivery. This focuses on the upgrade of pumping stations and lining of canal systems. The largest investment has been in the construction of an artificial lake, Altyn Asyr, and associated canal infrastructure to collect drainage water, which will eventually be used for irrigation purposes following natural purification. The Government understands, however, that an approach based on supply side infrastructure may not be sufficient. It has begun a large scale investment in high efficiency irrigation technologies, including (subsoil) drip irrigations systems, mobile sprinklers, and waste water capture and reuse, and has committed to scale up these activities in the new Agriculture and Water Strategy. Because prospects for development of new supplies are limited in Turkmenistan, improvements in efficiency are paramount for reliable supplies during the periods of hydrological drought in more arid

⁷ More than US\$4 billion has been pledged. However, it still remains to be seen how much will actually materialize.

⁸ In 2008, farmers managed to irrigate crops only twice instead of the regular practice of four times due to low levels of water across irrigation systems, largely as a result of drought

conditions to be brought about by climate change. For this reason, the AF programme will focus on the development of community level water management approaches in those regions where there is significant potential for diversified non-state agriculture, horticulture and livestock management. It will also seek to ensure water availability for the non-state sector by addressing the lack of fiscal incentives for more efficient water use in the state sector, and developing progressive tariffs.

The project is structured so that the majority of its activities are at a community level to deliver concrete adaptation benefits to identified communities in three typical agro-pastoral regions (mountainous, desert and oasis). The project will work directly with selected communities to help improve their resilience to increasing aridity and water stress through identifying and implementing effective and locally acceptable adaptation measures. For example, improvements of local water management options and communal water delivery services, seasonal water rationing and more flexible payout mechanisms will be introduced. The project also reaches out to communities that do not benefit from the irrigation services and practice rain-fed agriculture. For them improvement of water retention and harvesting techniques are critical for long term availability of water. The project therefore aims to deliver local level improvements in water access and management. Adaptive capacity and improved adaptation policies at the national level will be complemented by the local adaptation actions in the three target regions. The project will be implemented in regions that represent typical conditions of three major agro-ecological zones in Turkmenistan—that is, mountain, desert, and oasis systems. The project will tailor locally appropriate adaptation measures in these three areas in order to improve water delivery services that are adequate and effective under the area specific circumstances (see the component 2 for further details).

In order to support the scale up of community level adaptation solutions, at a national level, the project will support the implementation of a series of legislative modifications, particularly to the water code, its subsidiary legislation and regulations. These changes will be informed by socio-economic impact assessments of climate change with cost-benefit analysis of adaptation measures. The assessments, and related capacity development efforts of local technical officers will allow policy makers to adjust water pricing schemes, set productivity targets and target those communities who are currently most disadvantaged. The project will help to apply progressive (graduated pricing) and differentiated water tariff that allows cross-subsidies across water users of varied categories (e.g. farmers engaged in commercial farming versus small holder farmers on marginal lands). Introduction of this policy will have strong implications on future improvements in water service delivery to more disadvantaged farmers who will benefit from improved services and cross-subsidization. In order to induce efficiency, the price signal must be fair. This means that the tariff applied must reflect actual consumption, measured in a reliable way. Water pricing is an important tool for resource allocation because it provides guidance, both to users and to planners, in comparing alternative solutions.

Legislative framework

The Water Code defines in more detail the functions of the Cabinet of Ministers in relation to water resource management and conservation. Particularly, the Cabinet of Ministers annually sets water use limits for each of the political-administrative units - five *welayats* and each *etrap* - as well as for each sector of the economy, and they define water extraction limits for each water source. Article 12 of the Law "On the Cabinet of Ministers of Turkmenistan" prescribes the Cabinet of Ministers to address at its meetings the measures on protection and conservation of land, water resources, plants and animal communities. The Water Code defines mechanisms for this in accordance with the existing legislative procedure regarding *Basin Schemes on Integrated Use and Protection of Water Resources*, as well as through national, multi-lateral, and regional programmes and projects. A recent analysis of water and land use legislation by UNDP indicated that while not promoting radical change, the opportunity exists for more detailed elaboration of implementation strategies to achieve the stated aim of improved water efficiency and associated increases in agricultural outputs. Progress in developing supplementary regulations, standards, and norms has been relatively slow but there is increased understanding within Government of the need to accelerate this process.

Baselines for UNDP intervention

UNDP has undertaken a number of initiatives in the water sector, including assessment of Investment and Financial Flows in relation to water sector adaptation that has informed the Second National Communication, and a study on institutional and policy mechanisms within the water sector. There are a number of parallel activities related to protected area management and biodiversity. Some of the identified sites for this project under component 2 are currently receiving support from a UNDP-GEF and GTZ co-supported medium-size project under the Ministry of Nature Protection on sustainable land management that is completing in 2010 (Capacity building and on-the-ground investments for sustainable land management;SLM-Project). This project is also reviewing the options for community participation approaches that deal with environmental issues (potentially to include climate change impacts). The AF project is seen as being complementary to the land management activities under the current project, addressing water stress on local community farming and pastoral systems. Some of the measures tested by the UNDP-GEF project (such as dune fixation and stabilization, restoration of vegetative cover) remain relevant for the AF project as well and lessons on best practices from that initiative will inform this one. However, the design of these measures, their spatial distribution and scale will be informed by the climate change risks that were not considered in the UNDP-GEF initiative. The AF project will address adaptive water issues, such as the introduction of watering points for pastoralists, innovative communal management modalities for water service delivery, such as seasonal water rationing and flexible payment options. It is expected that the established structures and UNDP-GEF track record in these pilot regions will result in lower implementation risks, and a high degree of engagement and goodwill from local partners. The project will coordinate closely with the UNDP Climate Risk Management programme for Central Asia which is currently in inception phase. All activities will be complementary.

II. STRATEGY

National priorities

The project approach of Institutionalizing improved water management practices directly contributes to the pursuit of *Millennium Goal Number 7: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources.*

This project is developed in the light of the high level of government interest and commitment to providing improved living conditions for the population of Turkmenistan on the one hand, and the interest in providing a system of “environmentally sustainable economic management,” as expressed in Outcome 3 of the UNDAF, on the other. The project approach directly contributes to the pursuit of *Millennium Goal Number 7: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources.* More specifically, the outcomes generated by the project directly support Outcome 3.2 of the *UNDP Turkmenistan Country Programme* (“Environmentally sustainable use of natural resources contributes to effectiveness of economic processes and increased quality of life”) and Output 3.2.3 of the Country Programme Action Plan (Local communities contribute to and benefit from sustainable use of natural resources).

The programme is fully in line with existing national priorities relating to water and agriculture. National policy is defined by the Water Code. Its key provisions are

- Ownership over water and water resources of the country;
- Procedures of placing, design, and construction of water infrastructure;
- Types of water use and categories of water users;
- Procedures for receiving permits for specialized water use, rights and obligations of water users;
- Water protection arrangements and prevention of pollution including Water Protection Zones;

- State monitoring of water resources, State Water Cadastre;
- Participation of NGOs and wider public/communities organizations in water use and protection;

The National Programme “The Strategy of Economic, Political, and Cultural Development of Turkmenistan Until 2020” sets out targets in relation to agricultural outputs. The Programme envisages an increase in agricultural production of more than 15 times only due to utilisation of the current natural resource and accelerated industrial potential. Wheat production is planned to grow 2.9 times and cotton production – 4.9 times by 2020 as compared with 2000. A considerable proportion of irrigated agricultural lands is planned to be transferred to private sector enterprises. The private sector tenants will include joint-stock companies, *daihan* (farmer) cooperatives and unions. These categories of land users are expected to introduce more effective and efficient water use technologies and water saving practices.

A number of activities have recently cemented water and agricultural resilience as key strategic issues for national and regional development:

The water sector has been identified as the most important adaptation priority in the Second National Communication (expected early 2011). This document will set out the projected water deficit under current climatic projections, and outline a number of policies and measures for the agriculture sector to mitigate impacts.

The Investment and Financial Flows (I&FF) assessment (2010) undertaken by UNDP and the Government of Turkmenistan identified the water sector as the primary area for adaptation investment. It concluded that in addition to ongoing programmes of supply side infrastructure investment and upgrade, it was important to develop an effective demand side response and establish management systems that would result in sustainable use and allocation of increasingly scarce water resources.

The existing GoT five year water programme specifically promotes the more rational use of water. The National Socio-Economic Development Strategy of Turkmenistan to 2030 sets the objective of modernization of the water management system and improving water efficiency as well as increasing water storage capacity. The government has stated its aim of moving irrigated lands from a position of 90% state ownership to majority ownership by the private sector by 2020.

The National Agricultural Strategy specifically identifies the water requirements to meet state targets for strategic crop production. Recent legislation for the Agriculture sector – On Dayham Farm (2007) – sets out water provision requirements as central to the development of private sector agriculture, horticulture and livestock. There is an expected increase in the role of private farms, cooperatives and joint stock companies.

The programme will support current national agriculture sector priorities, including growth in agricultural outputs, an increase in agricultural and pastoral productivity, development of agricultural processing, and more rational matching of land use potential with economic activity.

At recent meetings of the “Council of Elders”, an ancient representing the traditional system of community leaders, in two consecutive years of 2009 and 2010, it was decided to make efforts to increase water productivity and reverse a trend of cultivated land expansion. This decision was triggered by increasing water deficits evidenced in the country in recent years due to climate change.

In 2010, the Government organized an international forum on water technologies, including for the agricultural sector with a focus on demand side management and efficiency.

The proposed concept is fully aligned with government’s current priority on social protection and development. The community level interventions and communal management solutions for improved water efficiency and delivery services are in direct alignment with government priorities.

Law of Turkmenistan “On State Support for Small and Medium Size Enterprise” (2009). This law supports the extension of private sector provision in the rural agriculture sector, including economic diversification into agro-processing industries.

An integrated water and agriculture strategy is under development, and publication is expected in early 2011 upon approval by the Cabinet of Ministers. This strategy is being informed by a) The Programme of Agricultural Development to 2030, b) The Concept Note for Development of Water Economy to 2030, and c) Proposal for Development of Water Economy to 2030. The Strategy is being led by the Ministry of Agriculture with support from the Ministry of Water. The draft strategy is expected to recognize the key role of water in delivering growth in agricultural production, productivity, and yields, and promote both supply and demand side solutions to ensure the efficient use of water within the Agro-Industrial complex. The development of an integrated strategy is to be accompanied by the relocation of the agricultural, water and natural resource ministries, together with their supporting institutes into a single building.

In particular, the integrated strategy will set out a comprehensive plan to address water and agricultural productivity. Some of the linkages under consideration include

1. Integrated water resource management within agro-industrial areas
2. Optimization modeling for agricultural production based on water use
3. Improvements to existing irrigation systems through education and awareness
4. Widespread introduction of drip and sprinkler irrigation technologies
5. Development of additional reservoirs for agricultural irrigation purposes
6. Development and introduction of drought resistant crops
7. Reuse of drainage and waste water for agricultural purposes

Capacity development

The project is structured to allow a high proportion of funds to flow into capacity building activities and demonstrations of low cost resilient technologies and management structures at the macro level, particularly in component 1 and 3. As such, the components are expected to result in a higher adaptation benefit than an equivalent investment into capital intensive infrastructure. A significant component of agricultural community vulnerability remains structural in nature, and requires a policy solution to change behavior, and build awareness of best practice, both among policy makers and agricultural communities. Further cost of adaptation reasoning is set out below.

Component 1:

Baseline: (without AF Proposal): Without the AF project, it is likely that the government of Turkmenistan will continue to be constrained in its capacity to design and customize the best international practice in relation to water pricing policies that progressively reflect the real value of water in the face of an increasing deficit scenario. It is also unlikely that the knowledge base related to the costs and benefits of demand side management measures will be developed, and as such, water efficiency will remain low within the agriculture sector, with mal-adaptation particularly common. There is currently little capacity to address water linkages with within the Land Use Code, and the current inefficient allocation of water resources is likely to continue for the foreseeable future.

AF Additionality (with AF funding): With AF resources, the Government will adopt a differentiated approach to water pricing with full account of social vulnerability and the solvency capacity of local population. The project will cover the cost of this progressive water policy that will yield much greater adaptation benefits than merely the standard infrastructure only development and rehabilitation. The project will engage international expertise to transfer best practice on water pricing models, to ensure that social impacts are

mitigated for the most vulnerable groups. It will also cover the cost of all necessary legislative and regulatory adjustments to optimize water allocation and distribution in the face of climate change. In addition, the project will support the effective analysis of the costs and benefits of agricultural sector water interventions that support climate resilience and improve water efficiency. The training of officials in sustainable water modeling and land use planning will support the development of land use management in the country, and underpin reform of the Land Use Code, which is central to water efficiency. The impacts of these knowledge based reform activities are expected to be significant in relation to their overall costs.

Component 2:

Baseline: Under current government proposals, the focus is likely to remain on expanding supply side capacity, particularly in terms of water storage, to support agricultural irrigation for government managed croplands and the provision of drinking water. Government officials will be limited in their ambition and capacity to address water demand due to a lack of national demonstration projects, and the absence of a methodology for assessing climate vulnerability. The absence of proof of concept for innovative water management techniques/technologies will lead to an increased supply/demand constraint as climate change impacts accelerate. This will impact most upon non-state actors, including those involved in agriculture, horticulture and livestock management. The current structure of agricultural support programmes by other donors and government neither consider climate impacts, nor their likely distributional effects on the agricultural economy.

AF Additionality: The AF project rebalances the prevailing focus within Turkmenistan away from state controlled crop management and large scale water systems, towards more efficient use of available resources through the demonstration of climate resilient demand and supply side water management techniques. With AF resource, the project will incur the cost of direct adaptation measures, covering 60,000 ha in the three typical agro-ecological zones in Turkmenistan that require distinct and locally tailored adaptation solutions for reducing water demand and improving water availability and supply systems. The zones and activities have been selected for their potential demonstration effect and their wider social importance, and as such will allow synergies with other agriculture economy strategies (poverty reduction, economic diversification) to be explored in national strategy development.

Component 3

Baseline: The relevant Ministries in the agro-industrial complex currently lack the capacity and expertise to scale up climate related water activities into national priority programmes, such as the communal management of water delivery services. Without the AF project, it is likely that the pace of reform within the sector will be slow, with limited development to community water management systems, adaptation planning and dissemination of best practice. Vital flexible mechanisms, such as seasonal water allocation and new payment regimes will remain untested. In this respect, the most marginal communities engaged in agricultural, livestock management are likely to suffer most, as government resources continue to be focused on state crop management.

AF Additionality: With AF funding, the project covers the cost of communal water management arrangements through strengthening roles and capacities of local associations that will continue enforcing locally appropriate and tested adaptation measures in water access and management. Providing investment funds through Water User Associations will encourage capacity at community level delivery systems, and support their ability to engage with and leverage government social development funds. Over 30,000 people will benefit directly from the AF investment under this component. Although to date, government and donor support initiatives have achieved significant improvements in local land management practices, they have yet to achieve the scale-up to regional and national level as elaborated in this proposal. The project covers the cost of the replication of well proven adaptation measures through

social protection and development programmes that will grant long term sustainability of the AF pilot investments.

Partnership strategy and coordination between stakeholders

1. The following table sets out potential involvement by key institutions

Stakeholder name	Stakeholder mandate	Potential role in the project
Ministry of Nature Protection	Environment, Nature Protection, Climate Monitoring	Executing agency; main national implementing counterpart
Ministry of Agriculture	Land Use Planning, Distribution and Management of Arable Lands	Member of the Project Board
Ministry of Water Economy	Distribution and Management of Water Resources, Management and Development of Irrigation Infrastructure	Member of the Project Board
Ministry of Economy	Economic Planning	Member of the Project Board
Research Institute of Water Management	Research on water quality and quantity issues	Project advisor
Institute of Desert, Flora and Fauna	Conservation and sustainable use of desert ecosystems and their resources	Project advisor
Institute for Strategic Planning and Development	Socio economic analysis; economic development trend and forecasting	Project advisor, recipient of modeling and prospective exercise training
Local Authorities	Local Planning and Administrative Decision-Making	Member of the Project Board
Local Communities	Use of Resources	Direct beneficiaries from the following regions: Karakum Region (Desert): Farmers and local authorities in several settlements of Rukhabat Etrap of Akhal Velayat

		<p>Nohur Region (Mountainous): Farmers in the Garawul and Konegummez settlements , in Bakharly Etrap of Akhal Velayat</p> <p>Sakar-chaga region (Mary Velayat oasis): Dayhan Farm "Zachmet" (approximately 300 farmers)</p>
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There are a number of ongoing initiatives of relevance to the proposed AF project, and efforts have been made to ensure that there is no duplication with other initiatives and that potential synergies are explored. Extensive stakeholder consultation has been undertaken with the major donors in the water and agriculture sector in Turkmenistan, including the European Union, USAID, OSCE, IFIs and selected bi-lateral donors (GTZ, British Embassy, etc.). The primary activities of relevance are identified as follows:

- a. European Union: The EU currently manages the main agricultural support programme in Turkmenistan – *Support to Further Sustainable Agricultural and Rural Development*. This programme is the latest in a series of activities running since 2005 to create capacity within the Ministry of Agriculture. Currently, the programme is focused more upon capacity building and systems within the Ministry, rather than upon water-agriculture policy reform, or regional dissemination of management practices and technologies. Discussions have been undertaken both with the Head of Europa House, the Head of the EU TA National Coordinating Unit and the EU programme team. There are a number of additional regional programmes (EURECA, TEMPUS) that touch on environmental and energy issues. There is clear agreement that the proposed AF project does not duplicate any of the activities and that it would be a welcome and complementary addition to the donor community programme.
- b. UNDP: UNDP has undertaken a number of initiatives in the water sector, including assessment of Investment and Financial Flows in relation to water sector adaptation that has informed the Second National Communication, and a study on institutional and policy mechanisms within the water sector. There are a number of parallel activities related to protected area management and biodiversity. Some of the identified sites for this project under component 2 are currently receiving support from a UNDP-GEF and GTZ co-supported medium-size project under the Ministry of Nature Protection on sustainable land management that is completing in 2010 (Capacity building and on-the-ground investments for sustainable land management;SLM-Project). This project is also reviewing the options for community participation approaches that deal with environmental issues (potentially to include climate change impacts). The AF project is seen as being complementary to the land management activities under the current project, addressing water stress on local community farming and pastoral systems. Some of the measures tested by the UNDP-GEF project (such as dune fixation and stabilization, restoration of vegetative cover) remain relevant for the AF project as well and lessons on best practices from that initiative will inform this one. However, the design of these measures, their spatial distribution and scale will be informed by the climate change risks that were not

considered in the UNDP-GEF initiative. The AF project will address adaptive water issues, such as the introduction of watering points for pastoralists, innovative communal management modalities for water service delivery, such as seasonal water rationing and flexible payment options. It is expected that the established structures and UNDP-GEF track record in these pilot regions will result in lower implementation risks, and a high degree of engagement and goodwill from local partners. The project will coordinate closely with the UNDP Climate Risk Management programme for Central Asia which is currently in inception phase. All activities will be complementary.

- c. USAID: USAID currently has no active water or agricultural programmes, but prior to 2008, has implemented a number of relevant initiatives. Discussions have been undertaken with the USAID acting Country Head and project management team as to how lessons learned may be incorporated into AF project implementation. From a water perspective, USAID conducted a number of seminars on water pricing, policy and standards. There has also been some limited work on the establishment of water user associations which has proven to be relatively successful. Other work has primarily been focused on water forecasting, flow measurement, groundwater exploration and data management technologies. There is a planned study on regional trans-boundary water issues in Central Asia in 2011. From an agricultural perspective, during 1991-2008, USAID provided 255 volunteer agricultural experts to support the development of private agricultural support services and registration of cooperatives. During 2004-2006, USAID worked with 15 farmer organizations in Mary and Dashoguz provinces to support economic expansion through provision of power, water supply and irrigation networks to increase agricultural productivity. During 2006-2007, there were also a number of agricultural market initiatives, and technology support programmes dealing with greenhouses, soil testing laboratories and fertilizers. USAID is also active in the field of economic diversification. No overlap was identified, and the project proposal was welcomed. Experience gained by USAID, particularly in Water User Associations and in the private sector provision of agricultural and horticultural services will be integrated into project delivery.
- d. EBRD: EBRD has been undertaking discussions with the Government on the establishment of microfinance institutions for the development of small scale SMEs, in particular for the rural agri and horticulture sectors. This initiative remains at an early stage, but may prove useful in the development of private sector provision of water management services for the communities identified within this proposal.
- e. OSCE: OSCE has a limited number of small agriculture grant based projects (USD\$10-20k). Following discussions with the programmer team, there are unlikely to be any synergies or duplication. No overlap was identified and the project proposal was welcomed.
- f. IFIs: From an IFI perspective, the World Bank currently has limited operations within the sector. The Asian Development Bank includes Turkmenistan in a number of regional environmental and land use programmes, but activities in the country are limited to date. The ADB Central Asian Countries Initiative for Land Management includes Turkmenistan in its remit, and may look at linkages between climate change and land management more generally in the region. The project team will maintain close contact and seek to identify synergies, where appropriate.

- g. **Bilateral:** GTZ is considering the expansion of its land management initiatives in the country. The project team has discussed options and will ensure that the AF project team and implementing agency will cooperate closely with GTZ to ensure complementarities and synergies going forward. This will be done through the project steering committee and donor community meetings. The project may offer a channel to feed lessons about potential agro-water adaptation measures into the wider government social development programmes, and this will be explored in more detail as and when the project develops. Elsewhere, discussions were also held with the British Embassy who are the most proactive on the issue of climate change, but there are currently no initiatives that would overlap.

Project goals and objectives

The main **objective** of the project is to strengthen water management practices at both local and national levels in response to climate change-induced water scarcity risks that are increasingly affecting farming systems in Turkmenistan. The project will assess and deliver concrete water adaptation measures to local vulnerable communities in the three typical agro-ecological regions, while also strengthening national level water legislation and pricing to ensure water availability for the non-state sector farmers. This combination of outcomes will ensure that concrete actions implemented through AF resources are sustainable beyond the lifetime of the project.

The programme of work has been structured to ensure that the various components are synergistic in terms of their objectives and delivery. The Government of Turkmenistan is already aware that water availability and affordability will be crucial to maintaining economic growth and social cohesion within the agricultural sector. This is particularly challenging when viewed against the projected climatic baseline set out in the Second National Communication for the UNFCCC (forthcoming). To meet this challenge, the government is focused on implementation of large scale water infrastructure investment designed to maximise storage and supply capacity. This is aimed at the support of large scale farming of strategic staple crops under the national procurement system (cotton, wheat, rice, sugar beet). Water efficiency infrastructure, such as sprinkler and drip irrigation systems, is also being integrated into these large scale farming operations. Even so, recent analysis undertaken within the UN IFF project, and findings within the Second National Communication indicate that such supply side measures are unlikely to be sufficient to meet the overall projected water deficit over the next 20 years. As a response, the government is issuing a new integrated national strategy for water and agriculture in 2011 which will address the efficiency issues in cotton and wheat farming.

It is crucial to improve water availability from climate resilience and cost efficiency perspective, in particular for the significant proportion of the rural population that is engaged in small scale agriculture and livestock management.

In this regard, there are a number of questions and challenges that the government faces that this project seeks to respond to in an integrated and comprehensive way. These are:

- a. What are the impacts of projected climate change on rural agricultural and livestock based communities within Turkmenistan who may not have access to large scale water infrastructure?
- b. What are the most effective technologies and management techniques for small scale rural demand management from a cost/benefit analysis, and how do these compare with supply side equivalents? Is it feasible to prioritize measures on a resource and cost efficiency basis?

- c. How do these water technologies and management techniques differ in terms of their suitability for different climatic and agricultural profiles within Turkmenistan and where are they best deployed?
 - d. What are the most suitable delivery mechanisms for the provision, management and maintenance of sustainable water management systems?
 - e. Can fiscal and billing mechanisms for water delivery be expanded to encourage more rational use of water by larger scale users without affecting poorer populations, thereby resulting in a more equitable allocation of water at a regional or river basin level?
 - f. How can water and climate change considerations be integrated into agricultural sector and economic development planning, and what tools exist to facilitate this, particularly in relation to sustainability and resilience?
 - g. Having identified potential solutions, what is the most effective way of scaling up community level best practice from local to national level, and how can knowledge be captured and replicated within national social development mechanisms?
2. To address these questions, the project is structured into 3 components as shown in Figure 1:
- a. *Component 1: Policy and Institutional Capacity Strengthening:* The first component is focused on improving the fiscal and management approaches by government towards water use in the state agriculture sector, in order to support the adoption of high efficiency irrigation techniques. This is important for local communities in that currently, water is diverted away from private sector agriculture and horticulture towards strategic state crops. In this regard, Component 1 seeks to build a sustainable basis for water adaptation, by weighing the cost effectiveness of various supply and demand side approaches, and by comparing these costs against those of the potential impacts of climate change, including from a social distribution perspective. This economic evidence base will be used to support water and agriculture modeling activities undertaken separately by the Ministries of Water Management and Agriculture. On the basis of economic outputs, it is expected that the project will support the reframing of water legislation to include climate change considerations, and help introduce regulations that support progressive water pricing and the communal management of water delivery services by the end of 2014. The linkages between water and potential reforms under the land use masterplan will also be established. It is not planned that there will be any market development activities for non-state crops as there is already well established demand for locally sourced vegetables, fruit and livestock products, and the issue is rather one of supply and productivity. The project will nonetheless work with any concurrent rural extension projects should they emerge to examine the potential to introduce added value processing and storage capacity to the communities involved in Component 2.
 - b. *Component 2: Community based adaptation initiatives:* Recognizing that Turkmenistan has limited experience with community based adaptation approaches and a historic preference for adopting large scale supply side infrastructure solutions, it is considered vital that the project demonstrate the efficacy of the various community scale water adaptation approaches (water user associations, drip irrigation, harvesting, water points, terracing, intercropping, saksaul planting, irrigation canal improvements etc.) A vulnerability assessment will be undertaken within 3 different agro-climatic regions – Nohur (Mountainous), Karakum (desert), and Sakar Chaga (Oasis) and hard water resilience measures introduced. These measures will primarily be targeted at community level approaches towards private sector agriculture, and the programme will seek to demonstrate the costs and benefits of these approaches at community level scale (up to 20,000 people). The lessons from these regional pilots will be used not only to inform the legislative reform process relating to land management and water use/pricing in component 1, but will also inform the development of larger scale communal management systems and their integration into the Government’s social development and poverty alleviation strategy in Component 3.

- c. *Component 3: Communal management systems for water delivery:* The third component relates to the scale-up of community level water management and delivery mechanisms based around technologies and techniques proven in Component 2, and supported by the economic analysis and legislative changes set out in Component 1. The work of Water User Associations (WUAs) will be supported, and funds provided for WUA led community adaptation plans and concrete investments in water management systems and infrastructure in the 3 target regions. Investment funds will be provided to support at least 4 small scale investments. The project will support WUAs to improve water delivery services for the target communities as well as identify and develop suitable project ideas under their community based adaptation plans, and will select projects on the basis of impact (improvements in water quantity and efficiency). Match funding will be sought where feasible from government and other funds, thereby demonstrating leverage and building WUA capacity to diversify their sources of investment and income. The types of investments will include small scale water storage systems/dams, canal refurbishment investments, farm level water distribution, sustainable wells and ground water extraction, water level monitoring systems (levels and mineralization content), efficient sluice gates for field flooding, efficient communal pumping systems and efficient small scale pumps, water drainage and capture/reuse technologies, and integrated agronomy/water management systems (including fertiliser use, land consolidation, crop diversification). In addition to concrete investment planning, WUAs will be supported to develop mechanisms to support water efficiency systems. Aspects that might be considered include seasonal water rationing and more flexible payout mechanisms. Finally, the project will explore how achievements can be integrated into national level policy, and how best practice can be disseminated to other regions through the government, and through other channels. These Components are further elaborated in terms of justification and activities in part II

Investments in 'hard' water management infrastructure will be designed to ensure that they meet the adaptation challenges of reduced water availability and increased aridity, and that they build community level resilience.

- In terms of canal activities, the focus will be primarily on clearance, refurbishment and lining to improve water availability and reduce losses in irrigated oasis areas. New construction activities will be mostly oriented towards collectors for drainage water, recycling and reuse. The canal systems of Sakar Chaga are the primary means of transport of water to the growing areas. They cannot be replaced by other technologies or mechanisms as without these canal systems, there would be no basis for agriculture, given the lack of natural river systems and prevailing arid conditions. However, losses within the canal system are high due to poor construction, maintenance and management. This reduces the amount of available water and therefore land under cultivation. Lined canals prevent water logging and salinity build-up in the fields adjacent to the canal. Cleared canals provide increased water flow and reduce evaporation and absorption rates. These activities will be complemented with the introduction on more efficient on-field water management practices to reduce demand. Measurement and efficient sluice gate systems, drip and spray systems will be integrated where appropriate at end user level. While the project promotes the efficiency rather than the expansion of the existing system, some small scale extensions to existing water delivery systems at farm level may be considered where appropriate, and will be constructed in such a way as to maximise efficiency and minimise losses (i.e. lined covered channels with metering systems). Canal refurbishment might be expected to have a much higher Benefit Cost Ratio (BCR) than construction of new canals, thereby promoting value for money at the project level. By integrating both supply and demand side measures, it is expected that canal investments will support increased agricultural productivity and reduce water losses.
- In terms of sustainable wells, the project envisages investment in two additional wells in the Yerbent region, to be agreed with Turkmenhydrology and the Ministry of Nature Protection based

on EIA considerations. There are considerable volumes of underutilised ground water reserves in Turkmenistan. Currently, livestock herders are concentrated in small areas surrounding the existing well infrastructure due to the prevailing arid conditions. This results in over grazing, land degradation and loss of pasture. Climate change is degrading the overall quality of pasture in the region, compounding the negative impacts of poor pasture management. The project will seek not only to address land management and stabilisation issues around existing wells, but by extending the well infrastructure to new regions, it will allow herders access to a much wider rangeland. This will counteract the impacts of degrading pasture quality and quantity, and allow desert pastoralists to maintain their livelihoods in more arid climatic conditions.

- In terms of small scale dams in the Nohur mountainous region, these will allow for improved water infiltration into soils, capturing moisture from heavy rainfall events that would otherwise result in run-off. These will be complemented by water efficiency techniques such as drip irrigation (to be fed by existing howdan reservoirs), soil management and terracing techniques (see section on project activities). Together, these investments will result in increased water capture and retention, and more efficient use. These benefits will support the sustainability and expansion of mountain based farming even though water availability is projected to decrease.

Project Components, Outputs and Outcomes

PROJECT COMPONENTS	EXPECTED CONCRETE OUTPUTS	EXPECTED OUTCOMES	AMOUNT (US\$)
1. <i>Policy and Institutional Capacity Strengthening</i>	1.1.1. Socio-economic impact assessment of climate change on water availability (with particular focus on agriculture) conducted; including cost-benefit analysis of adaptation measures through training and practical application by local experts;	1.1. Institutional capacity strengthened to develop climate resilient water policies in agriculture	(\$150,000)
	1.1.2. A package of modifications to the water code, with particular focus on basin/sub-basin level of water management; and financial incentives for water efficiency (e.g. differentiated and progressive tariff), and suggested links to the land use masterplan;		(\$200,000)

<p>2. <i>Community-based adaptation initiatives</i></p>	<p>2.1.1. At least 4,000 agri-pastoralists of the Nohur mountainous region develop and implement water harvesting and saving techniques (such as slope terracing, small rainwater collection dams, contour and stone bunds, planting pits, tillage, mulching) to improve soil moisture levels.</p>	<p>2.1. Resilience to climate change enhanced in targeted communities through the introduction of community-based adaptation approaches</p>	<p>(\$400,000)</p>	
	<p>2.1.2. At least 8,000 farmers implement community-based well and watering point management measures, including sand fixation and introduction of drought resistant traditional grain varieties in the Karakum desert region, ;</p>			<p>(\$400,000)</p>
	<p>2.1.3. At least 20,000 farmers in the Mary Oasis benefit from improved irrigation services through the introduction of canal level, localized management practice;</p>			<p>(\$500,000)</p>

3. Communal systems for water delivery	<p>3.1.1. Mandates and institutional functions of local water use associations in target regions strengthened to improve local water services that are more resilient to increasing water stress and benefit at least 30,000 farmers and pastoralists;</p> <p>3.1.2. Based on VCA assessments, community-based adaptation plans developed with particular focus on water delivery services designed and implemented in partnership with government social development programmes with direct engagement of at least 30,000 farmers and pastoralists</p> <p>3.1.3. Investment in at least 4 water management projects led by Water User Associations on the basis of the above VCA assessment, resulting in improved quality of agricultural water supply and strengthened WUA mandate and profile</p> <p>3.1.4. Lessons learned on community-based adaptation options in various agro-climatic conditions of Turkmenistan codified and disseminated (e.g. through ALM</p>	3.1. Community-managed water delivery services introduced to benefit over 30,000 farmer and pastoralist communities in the three target agro-ecological zones.	(\$150,000)
			(\$150,000)
4. Project/Programme Execution cost			\$ 250,000
5. Total Project /Programme Cost			\$ 2,700,000
6. Project Cycle Management Fee charged by the Implementing Entity			\$ 229,500 ⁹
Amount of Financing Requested			\$ 2,929,500

⁹ On the request of the Government of Turkmenistan the project will be implemented by UNDP using the MIE modality. UNDP is able to provide the following implementation services through its country office, regional and headquarters networks: project identification, formulation, and appraisal; determination of execution modality and local capacity assessment of the national executing entity; briefing and de-briefing of project staff; oversight and monitoring of AF funds, including participation in project reviews; receipt, allocation and reporting to the AF Board of financial resources; thematic and technical capacity building and backstopping; support with knowledge transfer; policy advisory services; technical and quality assurance; and troubleshooting assistance to the national project staff. Further details on the types of specialized technical support services which may be provided are articulated in the table provided to the AFB Secretariat on 14 May 2010 (as annexed).

Project output, components, and activities

The project is designed to contribute to the AF's portfolio level objective to "increase adaptive capacity to respond to the impacts of climate change, including variability at local and national level". The government of Turkmenistan requests a grant support from the Adaptation Fund to develop adaptive capacity of local communities in three agro-ecological zones of desert, oasis and mountainous parts (typical biophysical systems of the country). The government also requests support to develop policy incentives to increase water efficiency and help local communities adopt water related adaptation measures that will reduce water demand and improve supply services at the local level. Outcomes described below are aligned with the AF's outcome under objective 2 "Increased adaptive capacity within relevant development and natural resource sectors".

Component 1: Policy and Institutional Capacity Strengthening

Over the past 5 years, the government has invested approximately \$150-200 million in improving water delivery infrastructure (mainly in irrigation canals and drainage systems), and is planning to extend high efficiency irrigation technologies into the state agriculture sector. However, restructuring its water pricing policies is fundamental to achieving water efficiency and long term water productivity in the face of climate change. Decision-makers require the right type of information including rigorous risk assessments that incorporate socio-economic impact data. Currently, technical skill-sets and guidance are missing to undertake such assessments and to identify, design and implement sustainable climate resilient water policies. There are other knowledge gaps, including understanding of the requisite legal and regulatory foundations, economic costs, benefits and trade-offs and a host of other technical and feasibility issues. Through ongoing initiatives such as the Second National Communication and past initiatives such as the Investment and Financial Flows assessments, the government has acquired a certain degree of knowledge and understanding. However, more substantiated socio-economic arguments need to be put forward that will provide scientifically sound and evidence-based estimations of risks, costs of risks and cost-effective options to adapt. The following demonstrates the linkages between various subcomponents of regulatory reform and institutional capacity building:

- a. *Mapping the economics of water adaptation in the agriculture sector:* Currently, the choice of water management measures within government is not driven by a resource efficiency or cost-benefit perspective. There is a suspicion that current supply side measures represent a high cost response to potential water shortages in the agricultural system. The programme will finance a study, based on in-country fieldwork and a review of internationally available data, on the costs and benefits of various measures to manage water adaptation, both on the supply and demand side. This will make use of the emerging body of economic knowledge relating to adaptation, as well as the application of Integrated Assessment Modeling at a sector level. This will allow policy makers and communities to prioritize their technology and policy choices based on clear efficiency criteria, set against the cost of potential impacts in the sector.
- b. *Water Code reform:* Currently, Turkmenistan has a limited pricing structure for water, with charges for industrial and commercial agriculture, but with most social tariffs allowing free access to lower income users and state farmers. This results in poor and inefficient allocation mechanisms, and in a lack of incentives to undertake demand management by large portions of the agricultural community. On the basis of the outputs from the economics of water adaptation study, and the relevant sector model outputs, the project will seek to support changes to the Water Code to bring in a more progressive tariff structure. It will build capacity among relevant Ministries and authorities to design, for example, appropriate water tariffs that are socially sensitive and consider return value optimization. Change in water tariffs will yield improvements

in water availability to poor farmers by raising the levels of water efficiency and freeing essential resources for better maintenance and improved water service delivery to the poor. Experience will be taken from international experience in water reform, in particular pro-poor tariff structures being explored in South Asia, and by the UNDP's Human Rights based Water Management Programme in Central and Eastern Europe and CIS. This component will also explore the linkages to the national land use master plan for the agriculture sector, including the farm distribution plan. Working with the Ministry of Agriculture and the Ministry of Economy, the project will explore the introduction of targets for increased water productivity and measures to achieve these.

Component 1 addresses the capacity building and reform requirement at national and regional government level to ensure that policy is evidence based (particularly integrating climate change projections), that water management techniques are implemented from a cost benefit perspective with equal focus on supply and demand side approaches, and that the value of water is recognized as a commodity through progressive water pricing. These aspects build upon elements of existing reform and will feed through into land use policy. Without these, it is unlikely that demand side or community level approaches will be considered sensible by policy makers, and as such, these elements are considered vital. It is expected that activities under component 1 will create the enabling environment that will support effective community level water management and the shift towards Integrated Water Management that are developed in components 2 and 3

Component 2: Community-based adaptation initiatives.

The majority of AF resources will be allocated for implementation of concrete water and agricultural adaptation interventions at the community level. Despite increasing realization of water scarcity issues in Turkmenistan, and growing attention to and investments in water infrastructure, many communities that are not directly involved in cash crop production are unlikely to benefit from large scale investments. The majority of communities residing in three main agro-ecological zones of Turkmenistan are therefore under increasing pressure from water shortages. Their cropping, land and water management practices are often inappropriate in the context of pressures impinging upon the very ecosystem services they rely on. Consequently, land salinization, erosion and degradation of natural assets are common, thereby undermining the resilience of the communities in the context of emerging climate change risks. These pressures will be further amplified by prolonged droughts and overall aridification of the climate. The project will support local communities with financial resources to design and implement adaptation measures that will help overcome water related limitations to their local productive systems.

The project takes a bottom-up approach in assessing vulnerability and adaptive capacity in three geographic zones, representing three types of characteristic agro-ecological regions - mountain, desert and oasis - with agro-pastoralist, pastoralist and settled irrigated agriculture practiced, respectively. This type of geographic spread is determined by the potential for future replication of the measures that will prove successful in targeted compact localities and can be further scaled up in broader regions of similar characteristics.

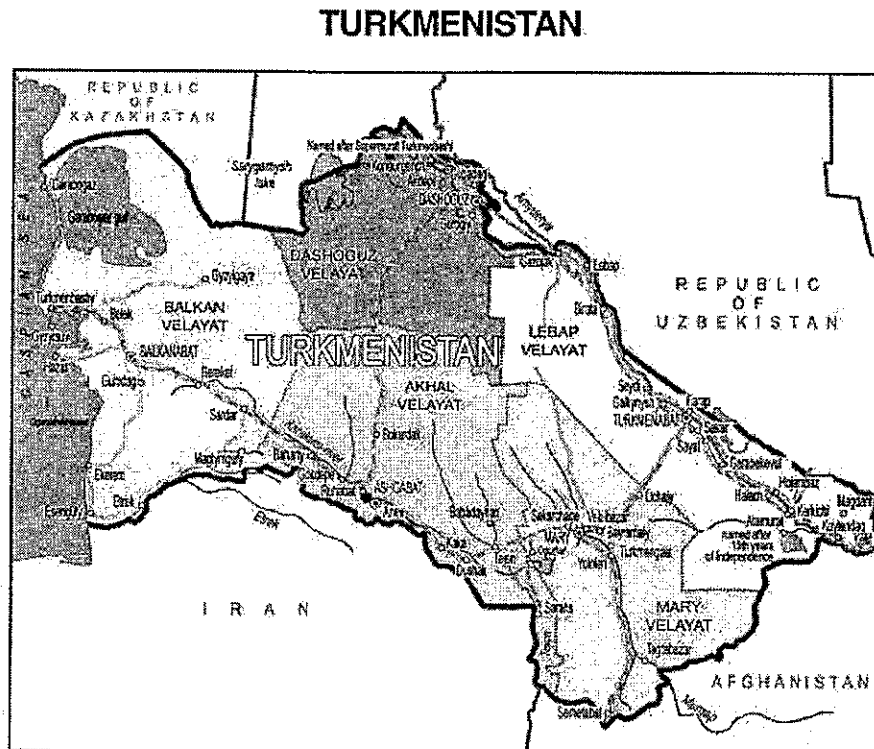
Component 2 will begin by applying a ***Vulnerability and Capacity Assessment (VCA)*** to the identified communities which will serve as the basis for analysis of existing and potential hazards to the sustainable development of the agro-pastoralist system. The tool box will draw upon best practice from those existing VCA models that integrate climate resilience analysis as a core component, rather than those that focus primarily on disaster risk analysis. In particular, the following tools and frameworks (including the UNDP proprietary methodologies) will be assessed for local suitability in the context of the proposed programme;

Examples of Vulnerability and Capacity Assessment Tools

Ref	Name	Developed by	Year	Intended users
1	ADAPT, Assessment & Design for Adaptation to Climate Change: A Prototype Tool	World Bank	ongoing	Project team within the Bank and client countries
2	ORCHID, Opportunities and Risks from Climate Change and Disasters	IDS, DfID	2006 - 2009	Development agency staff
3	Adaptation Policy Framework	UNDP	2004	Project planners (UNDP/GEF funding)
4	CRiSTAL, Community-based Risk Screening Tool – Adaptation and Livelihoods	IISD, IUCN, SEI, InterCooperation	2004 - ongoing	Project planners and managers

The VCA will form a core component in assessing and defining challenges within the identified regions to ensure that techniques and technologies are both climate resilient, and respond adequately to the identified hazards and natural resource challenges faced over the coming years. More detailed descriptions of the regions, ongoing activities and the proposed programmatic engagement are set out below:

Figure 2. Map of Demonstration Areas under Component 2



Nohur region (mountain region)

Agricultural background: The region lies in the south-western part of Central Kopetdag Mountains that represent mountainous agro-ecological zones in the country, closer to the border with Iran. Inhabited by approximately 12,000 people, the region practices agro-pastoralism and is spread over 9,000 ha. Across the region, the natural Juniper forests were cut down to be used for heating purposes. Water scarcity is a problem due to low precipitation levels. Traditionally villagers collect run-off from mountain slopes and gorges in specially built reservoirs (howdans). In favorable years the howdans store sufficient water to irrigate the fields during one season. But during the last 5-6 years the howdans have been left unfilled due to insufficient precipitation. In addition, the deforested slopes are failing to capture rainwater due to higher run-off levels. Due to water shortages, the population has gradually given up agriculture and horticulture, and has concentrated exclusively on livestock breeding. The pasture lands have as a result become overused, not letting the fodder for the animals re-grow on the stripped land, resulting in further erosion of the hill slopes.

Current Status: Improved water harvesting and saving techniques are necessary to ease the increasing shortages, and to allow communities to revert to agriculture, make livestock management more sustainable and to stop the increasing degradation of the slopes. Some of the villages have already begun small scale activities. A number of small water infiltration dams have been constructed on the cleared slopes to increase the infiltration of the rainwater into the soil, as short-term solution. The dams constructed in ravines capture the water streams, which form during heavy rains, thus increasing the moisture in the soil and assisting in restoration of the vegetation. One village (Konegummez) is piloting drip irrigation systems for a 10 ha orchard with plans for a further 30 ha alongside reduction of livestock numbers. Additional activities have been undertaken to replant juniper trees to try and stabilize the soil and increase moisture retention with up to 100 ha of replanting. At a community level, a number of villages in the region have already begun work on Village Development Planning (VDP), and this process may be used going forward for the integration of climate change adaptation into community decision making. Close cooperation will be maintained with the ADB CACILM project, which looks at regional land management issues and which is considering climate change issues from a land management perspective in the region in the coming years.

Proposed Activities: On the basis of the VCA, the project will work to develop and test water harvesting techniques, demand side efficiency measures and soil moisture management approaches that can support the livelihoods of 4,000 agro-pastoralists in the local communities. Techniques that will be evaluated and potentially implemented include water harvesting techniques, such as small scale slope terracing, contour stone and circular bunds, planting pits, living barriers. The rehabilitation of water infiltration dams on small streams will be explored. In terms of water retention and moisture capture perspective, the use of cover crops, mulching, minimum and zero tillage will be explored. To reduce evaporation and prevent loss of moisture, approaches may include use of windbreaks, dry and sparse seeding, fallow techniques, relay cropping and inter-cropping. From a water management perspective, further exploration will be undertaken of drip irrigation systems. The question of water pricing and provision of water services to off-grid communities will also be explored (building upon the water pricing work in Component 1).

Karakum region

Agricultural Background: Karakum region is located in the Central Karakum Desert and occupies an area of almost 842,000 ha with 8,000 inhabitants. The relief of the region is a combination of dunes of various forms and takyr depressions. The greater part of the region is represented by desert pastures, and for centuries, the sand desert with a prevailing continental climate and high variability of precipitation has been used by nomadic livestock breeders for extensive pasture. Intensive irrigation practices have contributed to land degradation. As people settled in villages, traditional practices of pasture management were forgotten. The lands started to be intensively exploited, especially around the villages and livestock

water points. Saxaul bushes were dug out and used for heating and cooking purposes as other alternatives are either too expensive or not available, and have not recovered due to over grazing. Moving sand dunes, and more frequent heavy sandstorms not only threaten houses and other social infrastructure, they also degrade pasture land further and damage the limited number of existing wells. The degraded pasture lands do not produce sufficient fodder for the animals. The lack of watering points has led to the concentration of animals around existing wells. A structural change in the pastoral system (more goats and cattle instead of camels; more unguarded pastures around settlements instead of far pastures) has resulted in degradation of the vegetation, particularly around settlements and watering points. Community based well management and introduction of watering points are necessary.

Current Status: A number of measures have been undertaken in relation to improved pasture management in the region that have proved successful. For example, Rukhabat Etrap has seen about 30 ha of reed reinforcement and 27 ha of saxaul planting to improve fixation of sand dunes. There have also been small scale repair and construction of water wells to expand the area of pasture land in use, thereby avoid localized degradation. Concrete water management requirements have been identified through the GTZ SLM project, and an opportunity exists to integrate water management into Village Development Plans (VDPs).

Proposed Activities: On the basis of the VCA, the Karakum sub-component will develop and test community-based well and watering point management measures, as well as piloting traditional drought resistant grain varieties. It is envisaged that the sub-component will reach up to 8000 farmers from the Yerbent region. The measures envisaged include fixation of sand dunes and water retention through saxaul planting and reed fixation. Focus will be upon scale up of water point availability through the upgrade of existing infrastructure and the development of new well infrastructure where appropriate. It is envisaged that 2 additional well points will have been constructed under the subcomponent by 2014. These will be undertaken on the basis of an environmental assessment and permissions from Turkmengeology and the Ministry of Nature Protection. Community level education and training will be undertaken to build awareness of sustainable livestock management practices.

Sakar-chaga region (Mary Velayat oasis)

Agricultural Background: Sakar-chaga is located in the north-western part of Mary Velayat in the delta of Murgab River. The region occupies a total area of 53,000 ha. 34 settlements and 17 farmer associations are located in Sakar-chaga Etrap. Population of the region is 132,000, the largest part of which lives in oases where 80% of settlements are located. The region is considered to be a primary centre of arable farming in Turkmenistan for cotton, grain and vegetables. Soil salinization is the main problem of this site due to inadequate irrigation techniques and lack of drainage and this has resulted in very modest harvests and low yields. This has resulted in the abandonment of previously arable areas. The current irrigation management system leads to irrational use of both water and land resources. While water allowances are calculated centrally according to crop type, in practice, the provision of water is poorly controlled due to inadequate poor canal infrastructure, leading to over-irrigation in places, and a lack of water in others. In addition, there is evidence of an informal system of water payment practices that can favor some users over others.

Current Status: A number of activities have been already undertaken in the region to stabilize agricultural output over recent years. Salinized soils are being regenerated and returned to productivity for small holders through composting. In particular high quality humus is being produced to improve soil salinity. Sustainable land management techniques are being taught to young farmers. Restoration of degraded lands is being pursued in collaboration with local authorities, including bush clearance of 50 ha, ploughing, and desalination through preventive leveling. From a water management perspective, some initial activities are underway. Water user plans have begun to be elaborated for a small number of water users. From an infrastructure perspective, one new collector (3.3km) was constructed and an existing channel of 6.4km cleared to improve collection of drainage water in the region. In addition, up to 60 measuring points

have been installed to monitor the level and mineralization of ground water. However, these activities remain relatively small scale, and do not address expected increases in water vulnerability resulting from progressive climate change.

Proposed activities: The Sakar-Chaga sub-component focuses upon the strengthening the role of local associations in delivering irrigation services and introduction of a canal level management. The subcomponent envisages a pilot area of about 700ha of irrigated lands provided with an upgraded infrastructure necessary to implement water-efficient irrigation plans. Local water users will be provided with the capacity to elaborate water efficient management schemes for the use of irrigation water. Lessons gained from decentralized water management planning by leaseholders will be elaborated documented and disseminated as part of the knowledge management strategy. In Sakar-chaga, the project may closely cooperate with a newly registered agricultural extension service which covers the topics of sustainable soil and efficient water management by i) individual consultation services; ii) Information days in the fields with farmers and iii) intensive training modules. This extension service will be registered by the end of 2010 and becomes operational by January or February 2011. The sub-component will also explore water pricing and the development of water services from the perspective of local water users.

In summary, in the identified regions, AF resources will target socially vulnerable agricultural and pastoralist communities to implement the following concrete adaptation measures.

- a. On the demand side, a series of agronomic measures aimed at rebalancing increasing water demand will be implemented. For example, measures such as sand dune fixation/stabilization by planting local *saksaul* and other shrubs will be undertaken. Such measures are essential for moisture retention and revival of vegetation cover; terracing, intercropping and planting of drought resistant local varieties will minimize water demand for agricultural practices, including pastoralism, and support sustainable livelihoods.
- b. On the supply side, AF resources will be used to design and test improved water harvesting measures, internalization of climate change risks into well and irrigation canal management options and *introduction* of sustainable watering points for pastoralists.

The project will build upon existing community links developed under previous development projects, including the currently concluding GTZ Sustainable Land Management Project. Experience of working in these regions indicates that there is a high level of motivation to participate, given the marginal support received from the State. A number of community level organisations exist that will facilitate roll out of the envisaged analysis and measures. For example the Community Extension service being developed in Sakar Chaga can be used for scale up and replication across the region. Commitments from the Parliament and respective national ministries indicate that the programme can expect regional support both to assist implementation, and to integrate best practice back into national strategy.

Research institutes, such as the Institute of Desert, Flora and Fauna and Research Institutes for Water Management under the Ministry of Environment and the Ministry of Water Economy will be engaged in identifying and designing technical details of the above noted and other locally appropriate adaptation measures. The project will put in place sub-basin and/or irrigation canal level climate resilient management practices. One micro initiative has already been designed and implemented by the Ministry of Water Economy but further support is required. This will be done with AF resources by reviewing the earlier results of the Berzen pilot implemented by the Ministry of Water.

Component 3: Communal management systems for water delivery services introduced

Overview: Component 3 seeks to implement efficient communal water management systems in the selected regions, through the development of Water User Associations (WUAs) and the integration of communal water practices into wider social safety nets. Component 3 establishes the mandates and

community investment plans for WUAs in the three identified regions. Investment funds will be provided to fund at least 4 water adaptation projects to be designed and implemented by WUAs, leveraging external government funds where appropriate. Lessons will be identified and scaled up to the national level.

Background: For the water related adaptation measures described under component 2 to be sustainable over longer periods of time, locally appropriate communal management structures will have to be put in place. This is to enhance the ability of communities to improve water delivery services, through improved management rights and greater accountability. Currently, the government is proposing large scale social programmes, designed to invest, largely in improving water and other physical and social infrastructure. The government also prioritizes social protection and development by focusing on water, namely upgrading drainage and irrigation infrastructure in the vast rural parts of the country. However, climate change risks and potential adaptation opportunities have not yet been accounted for in these programmes and they are often not accessible to small agricultural communities. Consequently, the long term sustainability of these investments is likely to be compromised. However, more farm-based, localized solutions are being overlooked, particularly for those farming systems that do not rely on irrigation. Important non-technological, communal management solutions for water productivity are necessary.

Activities:

- d. *WUA mandates and institutional capacity building:* Mandates and institutional functions of local water use associations in target regions will be strengthened to improve local water services that are more resilient to increasing water stress and benefit at least 30,000 farmers and pastoralists. Through the AF resources, these community associations will increase their functional role and engagement in shaping water adaptation solutions, including the delivery of water services. The project will strengthen existing community organizations/associations that will act as water supply and communal service providers. It is envisaged that the Water User Associations will support the pooling of resources for the operation and maintenance of their water system. The WUA will elect leaders, manage disputes, collect fees and implement maintenance, and will be built around water source infrastructure (either groundwater, water harvesting village dam or a canal). It is expected that the WUAs will operate within clearly defined resource boundaries, with an agreed set of rules, effective monitoring systems (water guards, gauges), and conflict resolution. Such structures increase accountability and more efficient water delivery and use.

- e. *Community based water adaptation plans:* Based on Vulnerability and Capacity Assessments (VCA) in each of the regions, community-based adaptation plans will be developed with particular focus on water delivery services. These will be designed and implemented in partnership with government social development programmes with direct engagement of at least 30,000 farmers and pastoralists. AF resources will support local associations and communal management organizations, such as water user associations, farmer associations and community organizations, to improve local response mechanisms and resilience to drought induced shocks and long term aridification that results in greater water shortages. Through a series of regular community mobilization meetings the communal associations will identify the most pressing needs in water access and services and in cooperation with the local government identify and plan the most acceptable solutions for subsequent funding from the social development programmes. Potential ideas may be co-funded under an investment programme through WUAs (below). Indeed, a key success factor of component 3 would be the inclusion of water related adaptation practices into the state social programmes that engage at a similar level and scale. This component aims to leverage a strategic opportunity to demonstrate the efficacy of integrating resilience into broader social vulnerability programmes.

- f. *WUA-led water sector investments at community level:* Finance will be provided for WUAs and associated community organizations to support investments in improved efficiency and quantity of agricultural water supply for local communities. On the basis of the above VCAs, the Water User Associations will prepare proposals for project financing. The project will support WUAs to formulate their investment proposals as part of their community adaptation plans under b. Potential investments will be selected on the basis of their ability to improve the delivery of water services, the ability to leverage match funding under government social protection or other funding mechanisms (see above), and the sustainability of the investment over time. At least 4 projects will be financed up to a total of \$400,000. This structure will encourage WUAs to build upon existing government social protection plans, and any emerging activities under the Agriculture and Water Strategies to 2030. It is expected that these structures will involve in excess of 30,000 farmers and water users across the 3 regions identified. The following list provides an overview of the potential types of investments that might be made by the Water User Associations:
- Small scale water storage systems/dams
 - Canal refurbishment investments (clearance, lining, covering)
 - Small scale distribution networks and farm level extension
 - Sustainable wells and ground water extraction
 - Water level monitoring systems (levels and mineralization content)
 - Efficient sluice gates for field flooding
 - Communal pumping systems and efficient small scale pumps
 - Water infrastructure maintenance equipment
 - Water drainage and capture/reuse technologies
 - Integrated agronomy/water management systems (including fertiliser use), land consolidation, crop diversification
- g. *Lessons learned:* Lessons learned on community-based adaptation options in various agro-climatic conditions of Turkmenistan codified and disseminated (e.g. through ALM and other networks). Successfully tested adaptation measures under component 2 will be advocated for further replication and sustainable funding by empowered and capacitated community organizations that participate in this initiative. Community associations will be empowered to manage water harvesting infrastructure and climate risks to local distribution canals of central irrigation systems. This community based arrangement will allow for more equitable distribution of water. The project, through these communal management structures, will introduce such service innovations as seasonal water rationing and flexible payment options. By driving water service delivery to locally appropriate and self-sustained communal systems, water services will be sustained under the conditions of a changing climate. A well tailored hybrid of government and community managed services of water delivery will emerge as a more cost-effective solution compared to top down, subsidized and poorly maintained service. Regular *lessons learned* notes providing field-based experiences of local, community-based adaptation measures, improved preparedness and resilience of local livelihoods to drought and water shortages will be produced for dissemination.

III. RESULTS AND RESOURCES FRAMEWORK

Objective: To strengthen water management practices at national and local levels in the context of climate change risks induced water scarcity to farming systems in Turkmenistan				
Outcomes and indicators	Baseline	Targets and Milestones	Source of Verification	Outputs and indicators
<p>Outcome 1: institutional capacity to develop climate resilient water policies in agriculture strengthened</p> <p>Indicator 1.1: Water code subsidiary laws and regulations that introduce progressive pricing policies and communal management for local water services are in place and operational.</p>	<p>Government has made progressive steps towards improving water management systems. It invests heavily in the improvement and upgrade of water infrastructure and looks out for more advanced technologies. However, water policies remain outdated as well as poorly enforced due to underdeveloped regulations and subsidiary legislation. Tools and methods are missing to identify the most cost-effective adaptation options in the water policies. Water pricing is largely inadequate.</p>	<p>A package of amendments to water code with proposed water tariff and other economic instruments developed and submitted for adoption by end of 2012</p> <p>Update of the water code to ensure explicit recognition of climate impacts on water resource availability by end of 2013</p> <p>At least 2 sets of sub-regulations developed under the Water Code to implement a) progressive and differentiated tariffs, b) support for water delivery services under communal</p>	<p>Project annual reports; Mid term evaluation, final report; training test results;</p> <p>National law journal</p>	<p>Output 1.1. Socio-economic impact of climate change on water availability costed and documented, including cost-benefit analysis of adaptation measures</p> <p>Indicator 1.1.1: Study on socio-economic impacts of climate change on water availability, including cost-benefit analysis of adaptation measures conducted;</p> <p>Indicator 1.1.2: Number of water legislative acts amended based on climate change cost estimations;</p> <p>Output 1.2: A package of modifications in the water code, with particular focus on communal water</p>

<p>Outcome 2: Resilience to climate change enhanced in targeted communities through the introduction of community-based adaptation approaches</p> <p>Indicator 2.1: Number of community based adaptation solutions</p>	<p>The current water policies burden the state budget and do not free resources for service improvement to farmers, especially local small holders. At the same time, farmers involved in large scale productions of water thirsty crop varieties do not receive adequate price signals to use water more efficiently. Given the increasing water shortages and priorities assigned to cash crop production the small holder subsistence farmers bear a disproportionate burden of exacerbating water deficits.</p>	<p>management</p>		<p>management; and financial incentives for water efficiency (e.g. differentiated and progressive tariff) developed;</p> <p>Indicator 1.2.1: Number of water regulations to introduce progressive and differentiated tariff and water delivery services under communal management</p>
<p>Outcome 2: Resilience to climate change enhanced in targeted communities through the introduction of community-based adaptation approaches</p> <p>Indicator 2.1: Number of community based adaptation solutions</p>	<p>Some of the coping mechanisms employed by farmers, agri-pastoralists and pastoralists in the main agro-ecological systems are increasingly strained due to mounting water deficits. A combination of innovative and traditional measures hasn't been tested to improve water capture, optimize water demand</p>	<p>At least one water harvesting technique and saving measures implemented in Nohur region to benefit 4,000 agri-pastoralists by end of 2014</p> <p>At least two watering points established in Karakum region to benefit 8,000 farmers and pastoralists by</p>	<p>Project annual reports; Mid term evaluation, final report; Community surveys;</p>	<p>Output 2.1: At least 4,000 agri-pastoralists of the Nohur mountainous region develop and implement water harvesting and saving techniques (such as slope terracing, small rainwater collection dams, contour and stone bunds, planting pits, tillage, mulching) to improve soil moisture levels;</p> <p>Indicator 2.1.1: water harvesting and saving techniques</p>

<p>implemented at the local level upon project closure.</p> <p>Indicator 2.2: % of population with improved water management practices resilient to climate change impacts in the targeted regions.</p>	<p>and improve water efficient applications. Over 2,000,000 people live in the target regions with the majority engaged in agriculture, mainly in marginal lands and having very limited access to stable water delivery services.</p>	<p>end of 2014</p> <p>Set of at least three agronomic measures (terracing, intercropping, saksaul planting) implemented in at least 3 communities by end of 2014</p> <p>Canal level irrigation improvement measures implemented in the Sakar-Chaga region to benefit 20,000 people by end of the project</p>		<p>demonstrated/tested in targeted Nohur area;</p> <p>Output 2.2: At least 8,000 farmers implement community-based well and watering point management measures, including sand fixation and introduction of drought resistant traditional grain varieties in the Karakum desert region;</p> <p>Indicator 2.2.1:</p> <p>Community based well and watering point management measures tested and demonstrated in targeted Karakum area</p> <p>Output 2.3: At least 20,000 farmers in the Mary Oasis benefit from improved irrigation services through the introduction of canal level, localized management practice;</p> <p>Indicator 2.3.1:</p> <p>Canal level management tested and demonstrated in targeted Sakar-Chaga area</p>
<p>Outcome 3: Community-managed</p>	<p>The State continues to play a far-reaching and predominant role in the</p>	<p>At least 6 associations have clear mandates, institutional capacities and skills to</p>	<p>Project annual reports; Mid-term evaluation, final</p>	<p>Output 3.1: Mandates and institutional functions of local associations strengthened to improve local water services that are more resilient to increasing</p>

<p>water delivery services introduced to benefit over 30,000 farmer and pastoralist communities in the three target agro-ecological zones.</p> <p>Indicator 3.1</p> <p>Number of associations with improved institutional capacity to deliver water services to target communities.</p> <p>Indicator 3.2: % of targeted population with more secure access to water services in the face of climate change where communal management systems adopted.</p>	<p>economy and acts as the main provider in ensuring adequate living standards of the population, with subsidies, price controls and the free provision of utilities underpinning the system. This has been possible largely due to revenues from the hydrocarbons sector. However, it poses large budgetary burden and results in unsustainable and ineffective water delivery services to farmer and pastoralists communities. Self-functioning and maintained services with the direct engagement of communities are not practiced. Despite existence of water user and farmer associations their role and capacities are limited to improve the water management and delivery options.</p>	<p>manage and deliver water services to the target communities by end of 2013</p> <p>At least 6 community plans on water adaptation have been designed and budgeted through the government's social development programmes by end of the project</p> <p>At least 4 local water adaptation investment projects have been funded through WUA and associated community organizations</p> <p>By end of the project at least 80% of targeted population of approximately 30,000 people has access to improved water services that are resilient to drought and climate aridification</p> <p>At least three lessons</p>	<p>report; Community Surveys; Social programme budget statements</p>	<p>water stress and benefit at least 30,000 farmers and pastoralists</p> <p>Indicator 3.1.1:</p> <p>Number of associations with modified mandates strengthening their institutional roles to manage and deliver water services to the target communities</p> <p>Output 3.2:</p> <p>Based on VCA assessments, community-based adaptation plans with particular focus on water delivery services designed and implemented through the government's social development programmes with direct engagement of at least 30,000 farmers and pastoralists</p> <p>Indicator 3.2.1:</p> <p>Number of community plans has been budgeted through the government's social development programmes</p> <p>Output 3.3: At least 4 projects funded up to a total of \$400,000 through WUAs and associated community groups</p>
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		<p>learned notes per targeted agro-ecological system, developed and widely disseminated through knowledge networks for further replication by end of project</p>		<p>Indicator 3.3.1: Number and value of projects through the WUAs</p> <p>Output 3.4: Lessons learned on community-based adaptation options under various agro-climatic conditions of Turkmenistan disseminated through ALM and other networks</p> <p>Indicator 3.4.1: Number of lessons learned notes formulated</p> <p>Indicator: 3.4.2: Number of lessons learned included in the ALM and other knowledge networks</p>
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IV. MANAGEMENT ARRANGEMENTS

The Ministry of Nature Protection (MNP) is the government institution responsible for the implementation of the project and will act as the Executing Agency (EA). The Ministry of Water will be an implementing partner of component 1. At the request of the Government of Turkmenistan, UNDP is the Multilateral Implementing Entity (MIE). The project is nationally executed (NEX), in line with the Standard Basic Assistance Agreement (SBAA, 1993) and the UNDAF 2010-2015 between the UN and the Government of Turkmenistan.

As a Multilateral Implementing Entity, UNDP is responsible for providing a number of key general management and specialized technical support services. These services are provided through UNDP's global network of country, regional and headquarters offices and units and include assistance in: project formulation and appraisal; determination of execution modality and local capacity assessment; briefing and de-briefing of staff and consultants; general oversight and monitoring, including participation in reviews; receipt, allocation and reporting to the donor of financial resources; thematic and technical backstopping; provision of systems, IT infrastructure, branding, and knowledge transfer; research and development; participation in policy negotiations; policy advisory services; programme identification and development; identifying, accessing, combining and sequencing financing; troubleshooting; identification and consolidation of learning; and training and capacity building.

As outlined in UNDP's application to the Adaptation Fund Board for accreditation as a Multilateral Implementing Entity, UNDP employs a number of execution modalities determined on country demand, the specificities of an intervention, and a country context. Under the national execution modality proposed, UNDP selects a government entity as the Executing Entity based on relevant capacity assessments performed by UNDP. Please note that UNDP uses slightly different terminology to that used by the operational policies and guidelines of the Adaptation Fund. In UNDP terminology, the "executing entity" is referred to as the "Implementing Partner" in countries which have adopted harmonized operational modalities and the "Executing Entity" in countries which have not yet done so. The Executing Entity is the institutional entity entrusted with and fully accountable to UNDP for successfully managing and delivering project outputs. It is responsible to UNDP for activities including: the preparation and implementation of work plans and annual audit plans; preparation and operation of budgets and budget revisions; disbursement and administration of funds; recruitment of national and international consultants and personnel; financial and progress reporting; and monitoring and evaluation. As stated above, however, UNDP retains ultimate accountability for the effective implementation of the project.

The MNP will assume responsibility for the implementation, and the timely and verifiable attainment of project objectives and outcomes. It will provide support to the management unit, and inputs for, the implementation of all activities. The MNP will nominate a high level official who will serve as the National Project Director (NPD) for project implementation. The NPD will chair the Project Board / Project Steering Committee (PSC), and be responsible for providing government oversight and guidance to the implementation. The NPD will not be paid from project funds, but will represent a Government in kind contribution.

The project will be nationally executed by the Ministry of Nature Protection in cooperation with the Ministry of Water (mainly under component 1) that is the main institution responsible for integrating climate change policies in all sectoral strategies and local natural resource management systems.

National Execution enables a greater level of national ownership. UNDP will provide technical backstopping, quality assurance and compliance with fiduciary standards in its capacity of MIE.

A Project Steering Committee (PSC) will be convened by the MNP, and will serve as the project's coordination and decision-making body. The PSC meetings will be chaired by the NPD. It will meet according to necessity, but not less than once in 6 months, to review progress, approve work plans and approve major deliverables. The PSC is responsible for ensuring that the project remains on course to deliver products of the required quality to meet the outcomes defined. The PSC's role will include: (i) overseeing project implementation; (ii) approving all work plans and budgets, at the proposal of the Project Manager (PM), for submission to UNDP Regional Center in Bratislava; (iii) approving any major changes in plans or programmes; (iv) providing technical input and advice; (v) approving major deliverables; (vi) ensuring commitment of resources to support implementation; (vii) arbitrating any conflicts within the project and/or negotiating solutions between the project and any other stakeholders and (viii) overall evaluation.

The day-to-day administration will be carried out by a Project Management Team (PMT). As per Government requests, the staff will be recruited using standard UNDP recruitment procedures. The PMT will manage the implementation of all activities, including: preparation/updates of work and budget plans, record keeping, accounting and reporting; drafting of terms of reference, technical specifications and other documents as necessary; identification, proposal of consultants to be approved by the PSC, coordination and supervision of consultants and suppliers; organization of duty travel, seminars, public outreach activities and other events; and maintaining working contacts with partners at the central and local levels. The PMT will liaise and work closely with all partner institutions to link the project with complementary national programmes and initiatives. The PMT is accountable to the MNP, UNDP and the PSC for the quality, timeliness and effectiveness of the activities carried out, as well as for the use of funds. The PM will produce Annual Work and Budget Plans (AWP&ABP) The PMT will further produce quarterly operational reports and Annual Progress Reports (APR) to the PSC, or any other reports at the request of the PSC. These reports will summarize the progress made versus the expected results, explain any significant variances, detail the necessary adjustments and be the main reporting mechanism for monitoring activities. The PMT will be technically supported by contracted national and international service providers, based on need as determined by the PMI and approved by the PSC. Recruitment of specialist services will be done by the PMT, in consultation with the UNDP and MNP and in accordance with UNDP's rules and regulations.

V. MONITORING FRAMEWORK AND EVALUATION

Project monitoring and evaluation will be conducted in accordance with established UNDP procedures. The logical framework provides performance and impact indicators for project implementation along with their corresponding means of verification. These and others to be developed prior to implementation will form the basis on which M&E of the project will be conducted. Table 6 provides a summary of the monitoring and evaluation plan plus a provisional budget.

In order to have a realistic picture of impacts, outcomes and performance, as well as sustainability, it is important to know the perspective of local and national stakeholders. Therefore, stakeholders and selected communities will have a key role in the monitoring process. A cross-section of stakeholders will be associated to the monitoring of the project results. Stakeholder workshops featuring farmers, CBOs, local authorities, governmental and, and possibly nongovernmental organizations will regularly be carried out to monitor progress and disseminate results.

The views of farmers and their associations will be sought by questionnaire survey and group discussion, and those of Government administration by face-to-face dialogue. This will be completed by the project team's observations, to serve as a basis for analysis and reporting.

The objectives of Monitoring and Evaluation activities are:

- To analyze project progress, impacts and achievements
- To assess the relationship between activities planned in the project document and those implemented
- To re-orient the project, if needed
- To draw conclusions for future transfer of activities to other areas
- To allow exchange of experience with other projects within and out of the country

Before the start of implementation, an inception workshop shall be held with participation of the project team, relevant government counterparts, the UNDP-CO and others (civil society representatives) etc. This inception workshop will treat the following issues:

- The project's monitoring and evaluation plan.
- Fine-tuning of indicators, means of verification and assumptions. This will include reviewing the log frame
- Definition of M&E responsibilities of the project team
- First annual work plan of the project on the basis of the log frame matrix with precise and measurable performance indicators

The inception workshop will also provide an opportunity for all parties to understand their roles, functions, and responsibilities within the project's implementation process, including reporting and communication lines, and conflict resolution mechanisms.

Type of M&E activity	Responsible Parties	Budget US\$*	Time frame
Inception workshop	<ul style="list-style-type: none"> ▪ Project Coordinator ▪ UNDP-CO 	\$3,000	Within first two months of project start up

Inception Report	<ul style="list-style-type: none"> ▪ Project team ▪ UNDP-CO 	None	Immediately following IW
Measurement of Means of Verification for Project Purpose Indicators	<ul style="list-style-type: none"> ▪ Project Coordinator ▪ 	None	Start, mid and end of project
Measurement of Means of Verification for Project Progress and Performance (measured on an annual basis)	<ul style="list-style-type: none"> ▪ Project Coordinator ▪ 	None	Annually prior yearly reports and to the definition of annual work plans
Monthly reports	<ul style="list-style-type: none"> ▪ Project team 	None	At the end of each month
Annual reports	<ul style="list-style-type: none"> ▪ Project team ▪ CoRI ▪ UNDP-CO 	\$2,000	At the end of each year
Meetings of the Project Coordination Committee	<ul style="list-style-type: none"> ▪ Project Coordinator ▪ UNDP-CO 	None	After the inception workshop and thereafter at least once a year
Technical reports	<ul style="list-style-type: none"> ▪ Project team ▪ External consultants 	None	To be determined by Project team and UNDP CO
Mid-term external evaluation	<ul style="list-style-type: none"> ▪ Project team ▪ UNDP-CO ▪ External consultants 	\$ 15,000	At the mid-point of project implementation.
Final external evaluation	<ul style="list-style-type: none"> ▪ Project team ▪ UNDP-CO ▪ External consultants 	\$ 15,000	At the end of project implementation
Final Report	<ul style="list-style-type: none"> ▪ Project team ▪ UNDP-CO 	None	At least one month before the end of the project
Publication of lessons learned	<ul style="list-style-type: none"> ▪ Project team 	\$ 10,000 (average \$ 2,000 per year)	Yearly
Audit	<ul style="list-style-type: none"> ▪ UNDP-CO ▪ Project team 	\$ 10,000 (average \$ 2,000 per year)	Yearly
Visits to field sites)	<ul style="list-style-type: none"> ▪ UNDP-CO ▪ CoRI ▪ Project team 	\$1,000	Yearly
TOTAL INDICATIVE COST		\$ 56,000	

NB: Above costs do not over UNDP staff time. All UNDP staff costs associated with M&E are covered by the MIE Fee. The M&E budget will be taken pro-rata from the three project component budgets, reflecting the size of the TA.

VI. LEGAL CONTEXT

This project document shall be the instrument referred to as such in the SBAA between the Government of Turkmenistan and UNDP, signed on October 5, 1993.

Consistent with the Article III of the Standard Basic Assistance Agreement, the responsibility for the safety and security of the executing agency and its personnel and property, and of UNDP's property in the executing agency's custody, rests with the executing agency.

The executing agency shall:

- a) put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried;
- b) assume all risks and liabilities related to the executing agency's security, and the full implementation of the security plan.

UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this agreement.

The executing agency agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via <http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm>. This provision must be included in all sub-contracts or sub-agreements entered into under this Project Document.

VII. ANNEXES

Annex A: RISK LOG

Risk	Risk Rate	Action
De-motivation of local water users to give up activities leading to land degradation; water logging; excessive irrigation and land salinisation.	Low	Active engagement of community leaders; employment VCA tools that mobilize community and engage participatory climate risk, vulnerability and capacity assessments; On the ground demonstration of results to motivate broader community members
Due to staff turnover at the target Ministries the trained staff may leave for other job opportunities undermining installed technical capacity	Medium	Special training conditions and / or training for trainers will be arranged to leave the trained staff at the target Ministries.
Reluctance of decision makers to introduce progressive and differentiated water tariff and policy within project lifetime	Medium	Active engagement of Ministry partners at senior level. Water pricing already exists for private sector farmers, with IBT pricing for leaseholders. Indications have been provided from the Ministries that potential review of water code is under consideration. Project design phase has included close consultations with Ministries and includes elements that are considered realistic within given timescales
Failure to include water in land use master plan or to establish basin level water management within current regulatory frameworks, and subsequent take up by Ministries within strategic frameworks	Low	Active engagement of Ministry Partners at senior level. Engagement with other donors and projects (previously) involved in related activities. Consultations with Deputy Ministers from key departments indicates interest in pursuing expansion of these approaches.

Annex B: Project Budget

Award ID:	TBC after AFB approval
Project ID:	Project 00074953 (PIMS 4450; Proposal 00059797)
Business unit	UNDP/GEF
Project title:	Addressing climate change risks to farming systems in Turkmenistan at national and community level
Implementing partner	Ministry of Nature Protection of Turkmenistan

Project Outcome/Atlas Activity	Responsible party/ implementing agent	Donor name	Budget description	Total (USD)
OUTCOME 1: Policy and Institutional Capacity Strengthening.				
Output 1.1 Socio-economic impact assessment of climate change on water availability (with particular focus on agriculture) conducted; including cost-benefit analysis of adaptation measures through training and practical application by local experts.		Adaption Fund	Travel	7,500
			Stakeholder Consultations	37,500
			International Experts	22,500
			National Experts	30,000
			Printing and publication	37,500
			Misc	15,000
			Sub-Total Output 1.1	150,000
Output 1.2 A package of modifications to the water code, with particular focus on basin/sub-basin level of water management; and financial incentives for	MoE		Travel	10,000
			Stakeholder Consultations	50,000
			International Experts	30,000

Project Outcome/Atlas Activity	Responsible party/ implementing agent	Donor name	Budget description	Total (USD)
water efficiency (e.g. differentiated and progressive tariff), and suggested links to the land use masterplan.			National Experts	40,000
			Printing and publication	50,000
			Misc	20,000
			Sub-Total Output 1.2	200,000
			Sub Total Outcome 1	350,000

OUTCOME 2: Community-based Adaptation Initiatives.

Output 2.1 At least 4,000 agri-pastoralists of the Nohur mountainous region develop and implement water harvesting and saving techniques (such as slope terracing, small rainwater collection dams, contour and stone bunds, planting pits, tillage, mulching) to improve soil moisture levels.	MoE	Adaptation Fund	Travel	80,000
			National Experts	40,000
Output 2.2 At least 8,000 farmers implement community-based well and watering point management measures, including sand fixation and introduction of drought resistant traditional grain varieties in the Karakum desert region.	MoE	Adaptation Fund	Sub-contracts	240,000
			Printing & Publication	20,000
			Misc	20,000
			Sub-Total Output 2.1	400,000
			Travel	80,000
			National Experts	40,000
			Sub-contracts	240,000
Printing & Publication	20,000			
Misc	20,000			
Sub-Total Output 2.2		400,000		

Project Outcome/Atlas Activity	Responsible party/Implementing agent	Donor name	Budget description	Total (USD)
Output 2.3 At least 20,000 farmers in the Mary Oasis benefit from improved irrigation services through the introduction of canal level, localized management practice.			Travel	100,000
			National Experts	50,000
			Sub-contracts	300,000
			Printing & Publication	25,000
			Misc	25,000
			Sub-Total Output 2.3	500,000
Sub Total Outcome 2			1,300,000	

OUTCOME 3: Community Systems for Water Delivery.

Output 3.1 Mandates and institutional functions of local water use associations in target regions strengthened to improve local water services that are more resilient to increasing water stress and benefit at least 30,000 farmers and pastoralists.	MoE	Adaptation Fund	Stakeholder discussions	37,500
			Travel	22,500
			International Experts	22,500
			National Experts	22,500
			Printing and publication	30,000
			Misc	15,000
			Sub-Total Output 3.1	150,000
			Stakeholder discussions	37,500
			Travel	22,500
			International Experts	22,500
National Experts	22,500			

Project Outcome/Atlas Activity	Responsible party/ implementing agent	Donor name	Budget description	Total (USD)
at least 30,000 farmers and pastoralists.			Printing and publication	30,000
			Misc	15,000
Output 3.3 Investment in at least 4 water management projects led by Water User Associations on the basis of the above VCA assessment, resulting in improved quality of agricultural water supply and strengthened WUA mandate and profile.			Sub-Total Output 3.2.	150,000
			Sub-contracts	280,000
			Travel	40,000
			National Experts	40,000
			Printing and publication	20,000
			Misc	20,000
			Sub-Total Output 3.3	400,000
Output 3.4 Lessons learned on community-based adaptation options in various agro-climatic conditions of Turkmenistan codified and disseminated (e.g. through ALM and other networks).	MoE	Adaptation Fund	Stakeholder discussions	25,000
			Travel	15,000
			International Experts	15,000
			National Experts	15,000
			Printing and publication	20,000
			Misc	10,000
			Sub-Total Output 3.4	100,000
Sub-Total Outcome 3			800,000	
Project/Programme Execution				

Project Outcome/Atlas Activity	Responsible party/ implementing agent	Donor name	Budget description	Total (USD)
Project Management		Adaptation Fund	Monitoring & Evaluation Costs (incl. Travel)	56,000
			Contractual Services (Project Management & Administration)	150,000
			Supplies	44,000
			Sub Total Project Management	250,000
			Sub Total Project/Programme Execution	250,000
TOTAL Project Implementation Costs				2,700,000
MIE fee for services detailed in ANNEX V (8.5%)				229,500
GRAND TOTAL				2,929,500

ⁱ Turkmenistan: Initial National Communication on Climate Change, 1998.

ⁱⁱ Turkmenistan Country Analysis. United Nations, 2008.

ⁱⁱⁱ Central Asia Regional Risk Assessment: Responding to Water, Energy and Food Insecurities. UNDP Regional Bureau for Europe and CIS. New York. 2009.

^{iv} Central Asia Regional Risk Assessment: Responding to Water, Energy and Food Insecurities. UNDP Regional Bureau for Europe and CIS. New York. 2009.