



ADAPTATION FUND

AFB/PPRC.1/10  
May 26, 2010

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Adaptation Fund Board  
Project and Programme Review Committee  
First Meeting  
Bonn, June 14, 2010

## **PROJECT/PROGRAMME PROPOSAL FOR TURKMENISTAN**

## I. Background

1. The Operational Policies and Guidelines for Parties to Access Resources from the Adaptation Fund, adopted by the Adaptation Fund Board, state in paragraph 41 that regular adaptation project and programme proposals, i.e. those that request funding exceeding US\$ 1 million, would undergo either a one-step, or a two-step approval process. In case of the one-step process, the proponent would directly submit a fully-developed project proposal. In the two-step process, the proponent would first submit a brief project concept, which would be reviewed by the Project and Programme Review Committee (PPRC) and would have to receive the approval by the Board. In the second step, the fully-developed project/programme document would be reviewed by the PPRC, and would finally require Board's approval.

2. The Templates Approved by the Adaptation Fund Board (Operational Policies and Guidelines for Parties to Access Resources from the Adaptation Fund, Annex 3) do not include a separate template for project and programme concepts but provide that these are to be submitted using the project and programme proposal template. The section on Adaptation Fund Project Review Criteria states:

*For regular projects using the two-step approval process, only the first four criteria will be applied when reviewing the 1st step for regular project concept. In addition, the information provided in the 1st step approval process with respect to the review criteria for the regular project concept could be less detailed than the information in the request for approval template submitted at the 2nd step approval process. Furthermore, a final project document is required for regular projects for the 2nd step approval, in addition to the approval template.*

3. The first four criteria mentioned above are:

1. Country Eligibility,
2. Project Eligibility,
3. Resource Availability, and
4. Eligibility of NIE/MIE.

4. Based on the Adaptation Fund Board Decision B.9/2, the first call for project and programme proposals was issued and an invitation letter to eligible Parties to submit project and programme proposals to the Adaptation Fund was sent out on April 8, 2010.

5. According to the paragraph 41 of the operational policies and guidelines, a project or programme proposal needs to be received by the secretariat not less than seven weeks before a Board meeting, in order to be considered by the Board in that meeting.

6. The following project concept titled "Addressing climate change risks to farming systems in Turkmenistan by improving water management practice at national and community levels" was submitted by the United Nations Development Programme (UNDP), which is a Multilateral Implementing Entity of the Adaptation Fund. It was received by the secretariat before the closing date for consideration of projects in the 10<sup>th</sup> Adaptation Fund Board meeting. The secretariat has carried out a technical review of the project concept and assigned to it the diary number AFB/MIE/Water/2010/2, and is submitting to the Project and Programme Review Committee the following documents:

1. Summary of the project, prepared by the secretariat.
2. The technical review sheet, filled in by the secretariat.
3. The original concept, as submitted (in Annex).

## **II. Recommendation**

7. The PPRC may want to consider and recommend to the Board:
  - a) Not to endorse the project concept contained in the Annex;
  - b) To request that UNDP either complement the concept with information addressing the criteria that are necessary to review it as a concept, or take these issues, and other issues suggested by the secretariat in the technical review sheet, into account when submitting a project proposal.

## 1. Project Summary

Turkmenistan – Addressing climate change risks to farming systems in Turkmenistan by improving water management practice at national and community levels

Implementing Entity: *UNDP*

Executing Entity: *Ministry of Nature Protection*)

Project execution cost: USD 250,000

Total project cost (execution included): USD 2,700,000

UNDP management fee: USD 270,000 (10%)

Total amount of financing requested: USD 2,970,000

Project Background and Context: Acidification of the climate is an observed trend in Turkmenistan, posing serious threats to water availability and land productivity. Water consumption in the country is highly wasteful due to the deteriorating irrigation infrastructure and subsidized water prices. Most of the water resources are allocated to water intensive cash crops. The proposed project aims to develop the adaptive capacity of the Government and local communities in three agro-ecological zones: a desert, an oasis, and a mountainous region. The main objective of the project is to address climate change risks of water scarcity to farming systems by improving water management practice at national and local levels.

### Component 1: Strengthening policy and institutional capacity (USD 850,000)

The expected outcome of this component is developing and enforcing climate resilient water policies in agriculture. The component includes providing a sound scientific and evidence-based estimation of risks, costs, and cost-effective options to adapt. This component also includes the design of socially sensitive water tariffs. Further, this component will introduce and train technical staff of relevant Ministries and other institutions in Dynamic Systems Modeling. The project will also make adjustments in land use and farm distribution plans to optimize land and water productivity.

### Component 2: Implementing community-based adaptation initiatives (USD 1,200,000)

The expected outcome of this component is a built resilience in six communities by introducing community-based adaptation approaches in the 3 aforementioned zones. This component includes bottom-up approach in assessing the vulnerability and adaptive capacity in the zones. The component will help design a series of agronomic measures, such as sand dune fixation; intercropping and recovery of drought resistant local varieties, and the establishment of seed multiplication banks under community managed funds. Community-based adaptation plans will also be designed and initiated

### Component 3: Knowledge management, dissemination of lessons learned and best practices (USD 400,000)

The expected outcome is to fully sensitize key national and community organizations on climate change issues that are relevant to their institutional mandates and objectives. This component includes the collation of all necessary socio-economic and biophysical data to construct a comprehensive climate change profile for the country. A report or publication will be produced and disseminated across the key ministries and stakeholders. Workshops will also be held to inform decision-makers on the key issues that Turkmenistan faces with regards to climate change. This component also includes the production of a lessons-learned note.



ADAPTATION FUND

## 2. ADAPTATION FUND BOARD SECRETARIAT TECHNICAL REVIEW OF PROJECT/PROGRAMME PROPOSAL

PROJECT CATEGORY: **REGULAR-SIZED PROJECT CONCEPT**

Country/Region: **Turkmenistan**

Project Title: **Addressing climate change risks to farming systems in Turkmenistan by improving water management practice at national and community levels**

AF Project ID: **AFB/MIE/Water/2010/2**

NIE/MIE Project ID: **00074953**

Requested Financing from Adaptation Fund (US Dollars): **2,970,000**

Regular Project Concept Approval Date (if applicable): **n/a** Anticipated Submission of final RP document (if applicable):

AFB Secretariat Screening Manager: **Mikko Ollikainen**

NIE/MIE Contact Person: **Keti Chachibaia**

Review Criteria	Questions	Comments
Country Eligibility	1. Is the country party to the Kyoto Protocol?	Yes.
	2. Is the country a developing country particularly vulnerable to the adverse effects of climate change?	Yes.
Project Eligibility	1. Has the designated government authority for the Adaptation Fund endorsed the project?	Yes (letter dated April 24, 2010).
	2. Does the project / programme support concrete adaptation actions to assist the country in addressing adaptive capacity to the adverse effects of climate change and build in climate resilience?	Requires clarification. Of the three project components, two deal with indirect adaptation measures such as (1) Policy and institutional capacity strengthening and (3) Knowledge management. The one that involves more direct measures, (2) Community-based adaptation initiatives implemented, is planned to receive less than half of the budget of the three. Also, the way in which (1) supports the more concrete activities in (2) requires clarification.
	3. Does the project / programme provide economic, social and environmental benefits, particularly to vulnerable communities?	Requires clarification. The project has a strong policy, research and knowledge management focus which indirectly could lead to such benefits but the way how the concrete benefits are presented is unsatisfactory. With predicted climate impacts, agriculture will face increased challenges. It should also be clarified, why the approach of increasing climate resilience through improvements in farming systems was chosen instead of choosing or including other livelihoods.

	4. Is the project / programme cost effective?	Requires clarification. The concept does not provide adequate information to assess effectiveness and it “will be looked into in greater details during the full project design phase.” Also, expected achievements additional to those of the GEF MSP project (below) need to be clarified.
	5. Is the project / programme consistent with national or sub-national sustainable development strategies, national or sub-national development plans, poverty reduction strategies, national communications and adaptation programs of action and other relevant instruments?	Requires clarification. The concept references the water sector as being “the most acute adaptation priority by the Second National Communication (currently under finalization)”. However, it is not elaborated how the practical work at the local or community level would link to the national priorities.
	6. Does the project / programme meet the relevant national technical standards, where applicable?	Requires clarification: “This section will be elaborated during the full project design phase”.
	7. Is there duplication of project / programme with other funding sources?	Requires clarification. The concept only references government social development programs and a GEF MSP on sustainable land management. Statement “However, the project is finishing already this year and therefore no time overlap or duplication is possible” would require clarification: in fact, the goals and activities of the above project ( <a href="http://www.undptkm.org">www.undptkm.org</a> ) are so similar that overlap is a real risk.
	8. Does the project / programme have a learning and knowledge management component to capture and feedback lessons?	Yes, but the current formulation is somewhat general and should be specified further.
	9. Is the requested financing justified on the basis of full cost of adaptation reasoning?	This requires further clarification and more specific budget break-down, especially regarding quantification of the expected results, and what additional results to the existing initiatives the project would produce.
Resource Availability	1. Is the requested project / programme funding within the cap of the country?	n/a (No cap decided yet)
Eligibility of NIE/MIE	2. Is the project submitted through an eligible NIE/MIE that has been accredited by the Board?	Yes.
Implementation Arrangement	1. Is there adequate arrangement for project / programme management?	n/a (Not required in Project Concept phase) (The basic structure of project management is provided.)
	2. Are there measures for financial and project risk management?	n/a (Not required in Project Concept phase) (A short risk management description is provided but would need to be detailed.)
	3. Are arrangements for monitoring and evaluation clearly defined, including budgeted M&E plans?	n/a (Not required in Project Concept phase) (A basic budgeted M&E plan is provided.)

	4. Is a results framework included?	n/a (Not required in Project Concept phase) (No. "Results framework will be prepared during the project design phase based on feasibility assessments and wide range consultations with the key stakeholders.")
Technical Summary	<p>"The main objective of the project is to address climate change risks of water scarcity to farming systems by improving water management practice in Turkmenistan at national and local levels. The project will operate at national level impacting water legislation and shaping overall adaptation policy in the country as well as at local level, reaching out the local vulnerable communities in the three typical agro-ecological conditions of Turkmenistan and tailor locally appropriate adaptation measures and help implement them."</p> <p>The components of the project are:</p> <ol style="list-style-type: none"> <li>1. Policy and institutional capacity strengthened to govern more climate resilient water policies, US\$ 850,000.</li> <li>2. Community-based adaptation initiatives implemented in 6 communities, in 3 agro-ecological zones, covering 950 thousand ha of total land area, US\$ 1,200,000.</li> <li>3. Knowledge management, dissemination of lessons learned and best practices, US\$ 400,000.</li> </ol> <p>The project concept promises impacts at these three different levels but the expected results are not quantified well, and the relationships between the different components are not well explained. Furthermore, the concept barely references an on-going GEF MSP on largely the same theme, and the relationship of these two projects is not clarified. A new project should ideally build on the earlier one but show complementarity and utilization of the earlier results (see above).</p> <p>Main concerns:</p> <ol style="list-style-type: none"> <li>1. Less than half of the total budget of the three components is proposed to component 2 which is the component that includes the most concrete adaptation activities within the project. The degree of required level of concreteness should be clarified by the AFB, and the arrangement of this proposal evaluated against it.</li> <li>2. The way in which the policy development component is linked with and contributes to the more concrete component 2 should be explained in more detail.</li> <li>3. Concrete benefits from the project to economy, social conditions and the environment should be described in more detail.</li> <li>4. It should also be clarified, why the approach of increasing climate resilience through improvements in farming systems was chosen instead of choosing or including other livelihoods.</li> <li>5. Avoiding duplication with other initiatives, including GEF Medium-Sized Project on sustainable land management, and finding complementarity with them should be explained in detail.</li> <li>6. More explanation is needed in relation to several other project review criteria as specified above.</li> </ol>	
Date:	May 26, 2010	



## PROJECT/PROGRAMME PROPOSAL

### PART I: PROJECT/PROGRAMME INFORMATION

PROJECT/PROGRAMME CATEGORY:	<b>REGULAR PROJECT</b>
COUNTRY/IES:	<b>TURKMENISTAN</b>
TITLE OF PROJECT/PROGRAMME:	<b>Addressing climate change risks to farming systems in Turkmenistan by improving water management practice at national and community levels</b> (PIMS 4450; Atlas IDs-TKM10, Proposal 00059797, Project 00074953)
TYPE OF IMPLEMENTING ENTITY:	<b>INTERNATIONAL IMPLEMENTING ENTITY</b>
IMPLEMENTING ENTITY:	<b>UNDP</b>
EXECUTING ENTITY/IES:	<b>MINISTRY OF NATURE PROTECTION</b>
AMOUNT OF FINANCING REQUESTED:	<b>\$2,970,000</b> (in U.S Dollars Equivalent)

### PROJECT / PROGRAMME BACKGROUND AND CONTEXT:

1. Meteorological drought is a semi-permanent condition in Turkmenistan, which receives on average only 191 mm of precipitation, per year. Over 80% of Turkmenistan's territory is desert. The country is therefore inherently water scarce, characterized by continental and very dry climate, with low levels of precipitation and moisture (35% on average). Almost half of the population is employed by the agriculture sector. Approximately 55% of the Turkmenistan population is situated in rural areas. 81% of this rural population is poverty-stricken<sup>1</sup>. 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 the livelihoods of the Turkmenistan population.

2. Turkmenistan is a predominantly flat country containing deserts and oases with mountainous zones<sup>1</sup> along its borders (mainly in the south). As a result of limited rainfall, 96% of Turkmenistan is characterised as arid land, making it the most arid of the five Central Asian countries. There are few rivers<sup>2</sup>, with little to no surface flows across most of the desert landscapes. Water shortages are common, particularly in the south and west of the country. Turkmenistan's inherent aridity and reliance on agriculture as a source of both income and food renders the country particularly vulnerable to predicted climate change impacts.

*Climate change impacts:*

Predicted climate change impacts include:

- An increase in average annual temperature of between 4.2 and 6.1°C by 2050<sup>3</sup>, 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 2050<sup>4</sup>;

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

<sup>2</sup> The largest river running through Turkmenistan is the Amu-Darya River.

<sup>3</sup> 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.



- An increase in average regional evaporation rates of 48% by 2050<sup>ii</sup>;
- An increase in the frequency and intensity of drought and flood<sup>5</sup> spells<sup>iii</sup>

3. Aridification of climate is an observed trend of climate change in Turkmenistan, posing serious threats to water availability and land productivity. Climate observations show that air temperature is steadily increasing in Turkmenistan as in the whole of Central Asia. Precipitation will become more sporadic, which will increase the frequency and intensity of drought and flood spells. Glacial retreat in Pamir-Altai will have significant impacts on water flows of Amudarya River<sup>6</sup>. As a result, significant breaches in water supply and agricultural production systems can be expected. 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 run-off formation is fully dependent on glaciers and precipitation contributes to only 1%. The transboundary river, Amu Darya is the main source of irrigation for Turkmenistan. 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 decreasing precipitation amounts. As a result, an average run-off reduction is expected to be 10%, during the vegetation period it will reach 30-40%. 15% of reductions in Amu Darya river flows by 2030 will have dramatic impacts on agriculture and food production in Turkmenistan.

*Critical root causes of vulnerability:*

(i) *water consumption in Turkmenistan is highly wasteful due to deteriorating irrigation infrastructure and subsidized water prices.* The availability of water in Turkmenistan is already constraining development and would continue to do so in the face of climate change. Despite this inherent water scarcity, Turkmenistan has among the highest water consumption per capita in the world<sup>7</sup>. In fact, water consumption per capita in Turkmenistan is more than two-fold that of any other country in Central Asia<sup>iv</sup>. 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<sup>v</sup>. Climate variability and change is likely to exacerbate the already existing gap between water supply and demand<sup>vi</sup>.

(ii) *as a result of soviet legacy, most of the water resource is allocated to water intensive cash crops.* The main consumer of water - Agriculture is a critical sector of economy as it accounts 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 under the total state control over inputs and marketing through state orders. Virtually all cotton and wheat crops are grown under the state order system and procured by the state at below-market prices. Some initial positive steps to initiate reforms of the state-order system for cotton have been recently taken by the government. To improve the productivity of these crops, the government provides some incentives<sup>8</sup> to farmers. These incentives are mainly provided to commercial farmers (who are involved in the large-scale production of wheat, cotton or rice) and not to the rural poor (who rely largely on subsistence farming of melons and vegetables). Unlike commercial farmers, the rural poor are unable to afford pumps for water and hence their productivity suffers<sup>9</sup>.

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<sup>4</sup> 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).

<sup>5</sup> 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>).

<sup>6</sup> The First National Communication to UNFCCC, Turkmenistan, 1998

<sup>7</sup> Oleg Guchgeldiyev, Manager of the project of the Ministry of Nature Protection of Turkmenistan, entitled “Conservation and Sustainable Use of Globally Significant Biological Diversity in Hazar State Reserve on the Caspian Sea Coast”, 16 October 2009.

<sup>8</sup> 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.).

<sup>9</sup> Oleg Guchgeldiyev, Manager of project of the Ministry of Nature Protection of Turkmenistan, entitled “Conservation and Sustainable Use of Globally Significant Biological Diversity in Hazar State Reserve on the Caspian Sea Coast”, 16 October 2009.

4. The government is increasingly aware of climate change related pressures over the water availability and agricultural productivity. For example, cotton production plans in Turkmenistan were fulfilled only by 79% in 2000 and 63% in 2001, largely due to the severe hydrological drought. Water requirements for crops will rise 30-40% due to higher evaporation rates. Unless the efficiency of irrigation systems climbs from 57% at present to 75% by 2050, there will be water deficit of 14km<sup>3</sup> in irrigated agriculture. Humidity deficits will also impact productivity of pastures<sup>10</sup>.

5. The government is also concerned that rising water deficits disproportionately impact the poorest farmers and most vulnerable families. In this regard, importance of rural development and social sectors has been underscored by the current government that has recently pledged more than US\$4 billion toward these priorities. Therefore, despite the complexity of the issue there is an expressed confidence that the progress is possible provided that adequate technical assistance will be delivered to the government.

6. Last year, the government of Turkmenistan undertook an assessment of Investments and Financial Flows (I&FF) required for adaptation in water sector and seeks for a follow-up support to move towards actual implementation of some of the critical recommendations that have emerged. The government is adamant in moving forward and designing a full fledged adaptation strategy with clear road map and plan of action. It also requests a foundational capacity development for adaptation in this critical sector as well as reaching out the most vulnerable communities in various agro-ecological zones, tailor and implement local adaptation measures that improve access to water and livelihood resilience.

7. 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 the water scarcity and chronic deficit<sup>11</sup> there are no administrative or incentive measures for water saving and efficiency; Moreover, in a current rush for meeting the state plans farmers are forced to plant more crops and use irrigation water excessively.
- b. The water code adopted in 2004 outdated and needs to be revised as to allow for more progressive water governance system to emerge. Current law enforces administrative level of water management; it does not clearly define the roles of local associations, neither has it provided any incentives for strengthening local water user associations. Water pricing policies does 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. Moreover, there is limited knowledge of tools and methods for socio-economic impact assessment 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) to grant uninterrupted water delivery, extension, or other social services and require more locally tailored approaches to address pressures on their livelihood, including the climate change.

8. The proposed project aims to address the above barriers. It will develop adaptive capacity of the government of Turkmenistan and local communities in three agro-ecological zones of desert, oasis and mountainous parts. The project will help undertake socio-economic impact assessment of climate change with cost and benefit analysis for adaptation measures. This will underpin the national strategy for adaptation, including the series of legislative modifications, particularly in water code. Adaptive capacities and improved adaptation policies at the national

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<sup>10</sup> World Bank., Drought Management and Mitigation Assessment for Central Asia and the Caucasus, Regional and Country Profiles and Strategies, 2006

<sup>11</sup> In 2008 farmers managed to water their crops only twice instead of regular practice of 4 times due to low levels of water across irrigation parameters, largely, as a result of drought

level will be complemented by the local adaptation action in the three target regions. Brief descriptions of key vulnerability conditions in the targeted regions are provided below.

### **Nahur region (mountain)**

The region lies in the south-western part of Central Kopetdag Mountains that represent mountainous agro-ecological zone in the country. The climate of the region is arid and sharply continental and characterized by hot summer and cold winter and uneven distribution of precipitation over the seasons. Inhabited by approximately 2 million people the region practices agro-pastoralism. Water scarcity is a problem due to low precipitation levels. Traditionally villagers gather the run-off from mountain slopes and gorges in specially built reservoirs called *howdans*. In favourable years the *howdans* store sufficient water to irrigate the fields during one season. But during the last 5-6 years the *howdans* were left unfilled due to insufficient precipitations.

### **Yerbent region (desert)**

Yerbent pilot region is located in the Central Karakum Desert, 80-260 km northward of capital city of Ashgabat and occupies area of almost 9,000 km<sup>2</sup> with 8,000 inhabitants. The relief of project's region is a combination of dunes of various forms and takyrs depressions. The climate is arid and sharply continental. The greatest part of the region (around 90%) is represented by the desert pastures. Pastures could be used throughout the year. There are numerous settlements scattered all over the region inhabited by the different numbers of families ranging from 3-4 to 100. Those are mainly pastoral families who live from the sheep-, goats-, and camels –breeding both private and state. Extensive livestock-breeding is the main source of income for local people. Traditionally distant-pasture animal husbandry (cattle, sheep, goats and camels) is the main activity of the local population. Natural desert pastures are used as the main forage base. The desert pastures have been experiencing a heavy degradation due to excessive animal pressure and absence of rational pasture management. Lack of watering points has led to the concentration of greater amount of animals around the existent wells. A structural change in the pastoral system (more goats and cattle instead of camels; more unguarded pasture around settlements instead of long distance pasture) has resulted in degradation of the vegetation, particularly around settlements and watering points. Moving sand dunes cover houses, schools and roads, and heavy sand-storms occur more and more frequently.

### **Sakar-chaga region (oasis)**

Sakar-chaga Etrap is located in the north-western part of Mary Velayat in the delta of Murgab River. The region stretches for 190km from south to north and 26 - 70km from east to west and occupies the total area of 1214,7 thous ha. 34 settlements and 17 peasant associations are located in Sakar-chaga Etrap. Population of the region is 112,000, largest part of which lives in oases where 80% of settlements are located. The climate of the region is continental with cold winter and hot summer, and low air humidity. The main human occupations in the region are agriculture and animal- breeding. The interregional drainage canal runs through the territory of Sakar-Chaga Etrap which causes tense meliorative regime of the territory. Due to disposal of drainage water the temporary and permanent lakes are emerging on rangeland deteriorating vegetation cover. Near 80% of population do not have access to drinking water. Soil salinization is the main problem of this site due to inadequate irrigation techniques and lack of drainage. The actual irrigation management system leads to irrational use of both water and land resources. Due to improper land levelling of irrigated land and high level of ground water, about 60% of irrigated land is prone to water logging. The productivity of irrigated land decreases from year to year because of irrational use of mineral fertilizers, salinization of soils and absence of appropriate systems of crop rotation. No monitoring of the ground water level, mineralization and salinization of soils is carried out.

9. The project will work in these geographic areas, directly with the communities to help improve their resilience to increasing aridity and water stress through identifying and implementing effective and locally acceptable adaptation measures. More details on types of measures are provided under the Part II, section A.

## **■ PROJECT / PROGRAMME OBJECTIVES:**

10. The main **objective** of the project is to address climate change risks of water scarcity to farming systems by improving water management practice in Turkmenistan at national and local levels. The project will operate at national level impacting water legislation and shaping overall adaptation policy in the country as well as at local level, reaching out the local vulnerable communities in the three typical agro-ecological conditions of Turkmenistan and tailor locally appropriate adaptation measures and help implement them.

**PROJECT / PROGRAMME COMPONENTS AND FINANCING:**

PROJECT COMPONENTS	EXPECTED CONCRETE OUTPUTS	EXPECTED OUTCOMES	AMOUNT (US\$)
1. policy and institutional capacity strengthened;	1.1.1. study on socio-economic impact assessment of climate change on water use and availability (with particular focus on agriculture and food production) conducted; including cost-benefit analysis of adaptation measures; 1.1.2. Introduction of Threshold 21 (T21) as a tool for cross-sectorial adaptation assessment and planning, through training and practical application; 1.1.3. A package of modifications in 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); 1.1.4. redesigned land-use master plan that optimizes farm distribution to reduce water requirements and increase potential of water productivity per unit of land; 1.1.5. adaptation strategy with costed action plan designed, covering cross-sectorial issues of water and agriculture.	1.1. strengthened institutional capacity to develop and enforce climate resilient water policies in agriculture;	\$ 850,000

2. Community-based adaptation initiatives implemented;	<p>2.1.1. vulnerability and capacity assessment (VCA) toolbox applied to establish key areas of community vulnerability and adaptive capacity needs;</p> <p>2.1.2. develop and test farm-based agronomic (tillage, cropping, terracing, drought resistant traditional grain varieties; etc), water harvesting and saving measures to improve farm productivity;</p> <p>2.1.3. capacities of local associations strengthened to improve local water management practices that are much more resilient to increasing water stress;</p> <p>2.1.4. introduce community fund (combination of drought resistant seed bank and community resources) as local drought mitigation and adaptation support mechanism;</p> <p>2.1.5. community-based adaptation plans designed and initiated;</p>	2.1. livelihood resilience built in 6 communities by introduction of community-based adaptation approaches in 3 agro-ecological zones covering total surface area of over 9,500km <sup>2</sup> ;	1,200,000
3. Knowledge management, dissemination of lessons learned and best practices;	<p>3.1.1. all national level socio-economic and biophysical data pertaining climate risk management consolidated;</p> <p>3.1.2. a comprehensive climate change country profile for Turkmenistan developed, widely disseminated and priority actions advocated across key institutions;</p> <p>3.1.3. lessons learned on community-based adaptation options in various agro-climatic conditions of Turkmenistan disseminated through ALM and other networks.</p>	3.1. key national and community organizations fully sensitized on climate change issues as relevant to their institutional mandates and objectives;	\$ 400,000
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 (if applicable)	\$ 270,000
<b>Amount of Financing Requested</b>	<b>\$ 2,970,000</b>

**PROJECTED CALENDAR:**

*Indicate the dates of the following milestones for the proposed project/programme*

MILESTONES	EXPECTED DATES
Start of Project/Programme Implementation	March 2011
Mid-term Review (if planned)	June 2013
Project/Programme Closing	September 2015
Terminal Evaluation	June 2016

**PART II: PROJECT / PROGRAMME JUSTIFICATION**

A. Describe the project / programme components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience.

**Component 1: Policy and institutional capacity strengthened to govern more climate resilient water policies**

11. The predicted reductions in rainfall and increase in evaporation rates will have significant implications for agricultural productivity under the business-as-usual development conditions. SNC of Turkmenistan reportedly identifies the water resources and agriculture sectors as being among the most vulnerable to climate variability and change impacts. Resources for the strategic sectors of water and agriculture are in abundance in Turkmenistan. In past 5 years, the government invested approximately in the range of \$150-200 million in improving water delivery infrastructure (mainly irrigation canals and drainage systems). However, technical skill-sets and guidance are missing to identify and implement sustainable climate resilient water policies, especially in the strategic sector of agriculture. Fundamental modifications are required in water policies in Turkmenistan in order to adapt to current and future stress of water availability posed by climate change. Through Second National Communication and Investment & Financial Flows studies, the government has acquired certain 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. By providing these assessments and analysis the project will instigate modifications in water code of the country. It will help design appropriate water tariffs that are socially sensitive and consider return value optimisation options. Differentiated and progressive water tariff will be designed for Turkmenistan that captures different social conditions as well as needs to increase water productivity over the time. Key institutions in Turkmenistan also lack skills and knowledge to undertake complex climate change impact estimations that feed into main policy formulations. As such, the project will introduce and train the technical staff of key Ministries and other institutions in the methods and application of Dynamic Systems Modeling. This is a tool used to support integrated cross-sectoral development planning and could be used to model the impacts of climate change and climate-related disasters on the economy and different sectors. An example of such a tool is Threshold 21 (T21)<sup>12</sup>, developed by the Millennium Institute, which supports analysis of different policy options. Based on these

<sup>12</sup> see [www.threshold21.com](http://www.threshold21.com)

advance tools and methods the project will help key government institutions to elaborate a national adaptation strategy with costed action plan for adoption and future implementation. Based on I&FF recommendations, the project will make adjustments in land use and farm distribution plan that will optimize land and water productivity.

**Component 2: Community-based adaptation initiatives implemented in 6 communities, in 3 agro-ecological zones, covering 950 thousand ha of total land area.**

12. Despite increasing realization of water scarcity issues in Turkmenistan, growing attention and investments into water infrastructure, many communities that are not directly involved into the cash crop production may not be able to directly benefit from these advancements. Lots of communities residing in three main agro-ecological zones of Turkmenistan are under the increasing pressures from water shortages. Their cropping, land and water management practices are often inappropriate resulting in land salinisation, erosion and degradation of natural assets. These processes will be further amplified by prolonged droughts and overall aridification of the climate. Although the government has put forward large scale social programmes, designed to invest approximately \$600,000 million in 2010 only, largely in improving water infrastructure, physical infrastructure, such as roads, schools and other social services. One of the indicators of success of this project, particularly under this component would be the inclusion of project demonstrated adaptation practices into the state social programmes. This is therefore strategic point in time to demonstrate effectiveness of locally appropriate adaptation measures through this project that can be uptaken and further scaled up by such state social programmes in future. 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. Project targets socially vulnerable communities in these regions to address their vulnerabilities to increasing climate change risks that stem from aridification. It will help design series of agronomic measures, such as sand dune fixation / stabilization that is essential for moisture retention and revival of vegetation cover; intercropping and recovery of drought resistant local varieties, establishing seed multiplication banks under the community managed funds that help communities draw on local resources and use this mechanism for immediate relief and shock absorption during prolonged dry spells or severe droughts. Research institutes, such as 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 indentifying and designing locally appropriate adaptation measures. The project will support local associations and communal management organizations to improve local response mechanisms and resilience to drought induced shocks and long term aridification. As such, the project will introduce and test sub-basin and / or irrigation canal (one full parameter) level management. One micro pilot has already been designed and implemented by the Ministry of Water Economy but further support is required. This will be done by the project by reviewing the earlier results of the Berzen pilot implemented by the Minister of Water.

**Component 3: Knowledge management, dissemination of lessons learned and best practices**

13. The project will create the knowledge base for adaptation. It will start by collating all necessary socio-economic and biophysical data and construct a comprehensive climate change profile of Turkmenistan. This will be done in a form of a user-friendly report / publication that will be widely disseminated in the country across key Ministries and institutions. Series of stakeholder workshops will be held to sensitize key decision-makers on the issues of climate change in Turkmenistan. This process will support a participatory and consensus-based approach to developing adaptation strategy of Turkmenistan under the component 1. The project will produce regular lessons learned notes providing a field-based experience of local, community-based adaptation measures, improved preparedness and resilience of local livelihoods to drought and water shortages. The project will produce a compiled version of lessons learned towards the end of project implementation that will synthesize the knowledge accumulated by the project at the community level.

**B. Describe how the project / programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities.**

14. By taking community-based approach to adaptation the project will deliver the direct benefits to local communities by improving their ability to withstand adverse impacts of increasing aridity and water stress. Improving local agronomic, land and water management practices fully tailored to local agro-climatic conditions, with the view of anticipated climate change, will deliver immediate and tangible socio-economic benefits for the most poor and vulnerable communities that are often overlooked in the big social programmes or state funded investments. The project also helps strength local community associations in their role to improve management of communal assets (leased by the state for community use, or under the management by community associations), such as irrigation canals, pasture lands etc. The project will also introduce a community managed fund that will be comprised of seed bank and other communal assets and resources that community can manage jointly and utilize as shock absorption mechanism during the catastrophic droughts. At the same time, the project is designed to influence key water related policies that will have longer term implications on resilience of country's economy to climate change impacts. Moving towards basin level management approaches and a gradual introduction of differentiated and progressive water tariffs seem unavoidable adaptation policy measures in the face of increasing aridification of the country. However, more targeted technical support is required for these critical changes to occur in foreseeable future. In so doing, the project will yield significant socio-economic benefits by helping the country avoid major water deficits and achieve better balanced supply and demand policies.

**C. Describe or provide an analysis of the cost-effectiveness of the proposed project / programme.**

15. The project is cost-effective as it takes balanced approach in targeting national water policy and local water users at sub-national level. Agriculture, including husbandry will remain the main source of employment and income generation in the rural Turkmenistan for many years to come. Therefore, optimizing local land management, tillage, cropping, water harvesting and saving practices is the most cost-effective option to invest in adaptation at sub-national level. Livelihood diversification approach at this point in time has not been considered equally cost-effective as it will require more significant up-front investment and setting up locally credible and robust micro-financing institutions. Given the centralized governance and financing context of Turkmenistan optimisation and improving of existing livelihoods and demonstrating effective measures that can be uptaken and eventually financed by the government social programmes seems the most cost-effective approach. However, the issue of cost-effectiveness will be looked into in greater details during the full project design phase.

**D. Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist.**

16. The project is fully in line with the national priorities. The water sector has been identified as the most acute adaptation priority by the Second National Communication (currently under the finalization). During the Investment and Financial Flows (I&FF) assessment the government selected the water sector for IFF assessment. Most of the infrastructure investment under the social programmes goes to improvement of water infrastructure. These are clear indicators of top priority assigned to water in the water stressed country.

**E. Describe how the project / programme meets relevant national technical standards, where applicable.**

17. This section will be elaborated during the full project design phase. National law and regulatory standards will be reviewed to ensure a full compliance with relevant standards.



**F. Describe if there is duplication of project / programme with other funding sources, if any.**

18. There is no duplication with any other projects in Turkmenistan. The project will feed in its lessons into the government social development programmes to ensure sustainable financing for identified adaptation measures in the target agro-ecological zones. Therefore, close cooperation is envisaged between the AF project and the government's social programmes. One area (Nurha region) is also covered by the UNDP-GEF supported medium-size project on sustainable land management. However, the project is finishing already this year and therefore no time overlap or duplication is possible. Moreover, key lessons and good practices from this initiative will be closely examined and considered by the AF project.

**G. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.**

19. The project has a dedicated component of knowledge management. Project annual reporting will require coverage of lessons learned. The project will systematically document key lessons good practices and challenges experienced in adopting more resilient integrated land and water management practices at local level and moving towards more progressive water policies at national level. Adaptation Learning Mechanism <http://www.adaptationlearning.net> and other relevant platforms will be used for knowledge dissemination.

**H. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation.**

20. The project has emerged as a result of SNC and I&FF assessments and was conceived at the Ministry of Environment in consultation with national experts and key personnel of the Ministry of Water Economy and other organizations. UNFCCC focal point hosted by the Ministry of Environment has been part of the consultation process. Wider participation and consultations will be arranged with the key government stakeholders as well as local communities during the project design phase. Key stakeholders have been listed in the table below. The list will be further expanded during the project formulation phase when more detailed stakeholder analysis will be undertaken.

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	Research on water quality	Project advisor

Water Management	and quantity issues;	
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

**I. Provide justification for funding requested, focusing on the full cost of adaptation reasoning.**

21. The project is designed to address adverse impacts of climate change on farming systems by aggravating water shortages. The project is taking two-pronged approach: (i) addressing the need for water efficiency, including the incentives for water savings and improved water management policies overall; and (ii) improving local community-based water harvesting, use and saving options that are to maximize use of limited resource and increase its per unit value. These are priority adaptation measures in water sector at both macro and micro level that the project will cover.

 **PART III: IMPLEMENTATION ARRANGEMENTS**

**A. Describe the arrangements for project / programme implementation.**

22. 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). UNDP is the Multilateral Implementing Entity (MIE) for the project. 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.

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

24. Working closely with the MNP, the UNDP Country Office (CO) will be responsible for: (i) providing financial and audit services to the project; (ii) recruitment of project staff and contracting of consultants and service providers; (iii) overseeing financial expenditures against project budgets approved by PSC; (iv) appointment of independent financial auditors and evaluators; and (iv) ensuring that all activities including procurement and financial services are carried out in strict compliance with UNDP procedures. A UNDP staff member will be assigned with the responsibility for the day-to-day management and control over project finances.

25. 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 the

necessity, but not less than once in 6 months, to review project progress, approve project work plans and approve major project 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 in the project document. The PSC's role will include: (i) overseeing project implementation; (ii) approving all project 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 project plans or programs; (iv) providing technical input and advice; (v) approving major project deliverables; (vi) ensuring commitment of resources to support project implementation; (vii) arbitrating any conflicts within the project and/or negotiating solutions between the project and any parties beyond the scope of the project; and (ix) overall project evaluation.

26. The day-to-day administration of the project will be carried out by a Project Manager (PM) and Project Assistant (PA), who will be located within the MNP offices. The project staff will be recruited using standard UNDP recruitment procedures. The PM will, with the support of the PA, manage the implementation of all project activities, including: preparation/updates of project work and budget plans, record keeping, accounting and reporting; drafting of terms of reference, technical specifications and other documents as necessary; identification, proposal of project consultants to be approved by the PSC, coordination and supervision of consultants and suppliers; organisation of duty travel, seminars, public outreach activities and other project events; and maintaining working contacts with project partners at the central and local levels. The Project Manager will liaise and work closely with all partner institutions to link the project with complementary national programs and initiatives. The PM is accountable to the MNP 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 PM 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 by the project versus the expected results, explain any significant variances, detail the necessary adjustments and be the main reporting mechanism for monitoring project activities. The PM will be technically supported by contracted national and international service providers. Recruitment of specialist services for the project will be done by the PM, in consultation with the UNDP and MNP and in accordance with UNDP's rules and regulations.

**B. Describe the measures for financial and project / programme risk management.**

Risk	Risk Rate	Action
Demotivation of local and 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 mobilizes community and undertakes participatory climate risk, vulnerability and capacity assessment; On the ground demonstration of results to motivate broader community members
Adaptation strategy will not be approved	Medium	Measures incorporated into the social programmes; Priorities identified and incorporated into sectoral or area-based plans and strategies.
Climate risk assessment and adaptation planning tools lack ownership for continuous use	Medium	Increase the strategic purpose of the product in terms of long-term planning by the ministry of economy

**C. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.**

27. Project monitoring and evaluation will be conducted in accordance with established UNDP procedures with support from an independent international consultant. The logical framework of the project provides performance and impact indicators for project implementation along with their corresponding means of verification. These will form the basis on which M&E of the project will be built. Table 6 provides a summary of the monitoring and evaluation plan plus a provisional budget.

28. Socio-economic indicators will be developed during the project activities in order to facilitate M&E.

29. In order to have a realistic picture of the project impact, outcomes and performance, as well as sustainability, it is important to know the perspective of local and national stakeholders. Therefore, the 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.

30. 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.

31. 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 in the field
- 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

32. Before the start of the project implementation an inception workshop shall be held with participation of the project team, relevant government counterparts, the UNDP-CO. 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

33. 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, implementation process, including reporting and communication lines, and conflict resolution mechanisms.

M&E Activity	Responsible Party	Budget (US\$)	Time Frame
Inception workshop: project	MNP, PMU (Project team), UNDP	3,000	At the beginning of

planning documents and M&E plan			project implementation
Meeting of steering committee (= Tripartite Review) (see point 14)	Government, UNDP, PMU	5,000	Yearly First year: twice
Regular progress reports for project steering committee Annual Progress Report (APR) and Tripartite Review Report (PIR)	PMU with participation of communities, External consultant	-	Every six months annually
Mid-term evaluation	UNDP, MNP with participation of communities, External consultant	15,000	At the mid-point of project implementation
Final external evaluation	UNDP, MNP with participation of communities, External consultant	15,000	At the end of project implementation
Terminal Report	UNDP, PMU	2,000	At least one month before the end of the project
Audit	UNDP, MNP, PMU	12,000	Yearly
Visits to field sites	Project steering committee, PMU	4,000	Yearly
<b>TOTAL COST</b>		<b>56,000</b>	

**D. Include a results framework for the project proposal, including milestones, targets and indicators.**

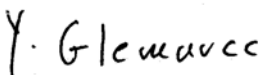
Results framework will be prepared during the project design phase based on feasibility assessments and wide range consultations with the key stakeholders.

**PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY**

**A. RECORD OF ENDORSEMENT ON BEHALF OF THE GOVERNMENT<sup>13</sup>** *Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:*

<i>(Enter Name, Position, Ministry)</i>	<i>Date: (Month, day, year)</i>
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**B. IMPLEMENTING ENTITY CERTIFICATION** *Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address*

<p>I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans and subject to the approval by the Adaptation Fund Board, understands that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.</p>	
	
<p>Yannick Glemarec          Director          Environmental Finance          UNDP          Implementing Entity Coordinator</p>	
<p>Date: April 22, 2010</p>	<p>Tel and Email: +1-212-906-6843;  <a href="mailto:yannick.glemarec@undp.org">yannick.glemarec@undp.org</a></p>
<p>Project Contact Person: Keti Chachibaia</p>	
<p>Tel. and Email: Tel: +421 2 59337 422; <a href="mailto:keti.chachibaia@undp.org">keti.chachibaia@undp.org</a></p>	

<sup>6</sup>. Each Party shall designate and communicate to the Secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

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<sup>i</sup> Drought: Management and Mitigation Assessment for Central Asia and the Caucasus. 2005. The World Bank: Europe and Central Asia Region. Report No: 31998-ECA

<sup>ii</sup> Turkmenistan: Initial National Communication on Climate Change, 1998.

<sup>iii</sup> Turkmenistan Country Analysis. United Nations, 2008.

<sup>iv</sup> Central Asia Regional Risk Assessment: Responding to Water, Energy and Food Insecurities. UNDP Regional Bureau for Europe and CIS. New York. 2009.

<sup>v</sup> Central Asia Regional Risk Assessment: Responding to Water, Energy and Food Insecurities. UNDP Regional Bureau for Europe and CIS. New York. 2009.

<sup>vi</sup> Kokorin, A. (2008) World Bank Adaptation Report.