REQUEST FOR PROJECT/PROGRAMME FUNDING FROM ADAPTATION FUND

The annexed form should be completed and transmitted to the Adaptation Fund Board Secretariat by email or fax.

Please type in the responses using the template provided. The instructions attached to the form provide guidance to filling out the template.

Please note that a project/programme must be fully prepared (i.e., fully appraised for feasibility) when the request is submitted. The final project/programme document resulting from the appraisal process should be attached to this request for funding.

Complete documentation should be sent to

The Adaptation Fund Board Secretariat
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Washington, DC. 20433
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Email: secretariat@adaptation-fund.org

ADAPTATION FUND

DATE OF RECEIPT:
ADAPTATION FUND PROJECT ID:
(For Adaptation Fund Board Secretariat Use Only)

PROJECT/PROGRAMME PROPOSAL

PART I: PROJECT/PROGRAMME INFORMATION

PROJECT/PROGRAMME CATEGORY: **REGULAR PROJECT**
COUNTRY/IES: **UZBEKISTAN**
TITLE OF PROJECT/PROGRAMME: **DEVELOPING CLIMATE RESILIENCE OF FARMING COMMUNITIES IN THE DROUGHT PRONE PARTS OF UZBEKISTAN** (PIMS 5002, ATLAS IDS – UZB10, PROPOSAL ID: 00066434; PROJECT ID: 00082613)
TYPE OF IMPLEMENTING ENTITY: **MULTILATERAL IMPLEMENTING ENTITY (MIE)**
IMPLEMENTING ENTITY: **UNDP**
EXECUTING ENTITY/IES: **UZHYDROMET (HYDRO-METEOROLOGICAL SERVICE AT THE CABINET OF THE MINISTERS OF UZBEKISTAN);**
AMOUNT OF FINANCING REQUESTED: **USD 5,415,103**
CO-FINANCING: USD 200,000 (UNDP)
PROJECT DURATION: 6 YEARS (MAY 2014- MAY 2020)

PROJECT / PROGRAMME BACKGROUND AND CONTEXT:

Provide brief information on the problem the proposed project/programme is aiming to solve. Outline the economic social, development and environmental context in which the project would operate.

1. Uzbekistan is a lower middle income, resource rich, doubly-landlocked country, strategically located in the heart of Central Asia. It is bounded by Kazakhstan to the north and west, Turkmenistan and Afghanistan to the south, and Tajikistan and Kyrgyzstan to the east (Figure 1). Its total land area is 448,900 km^2, of which 78% are plains, and 22% are mountains and mountainous valleys.

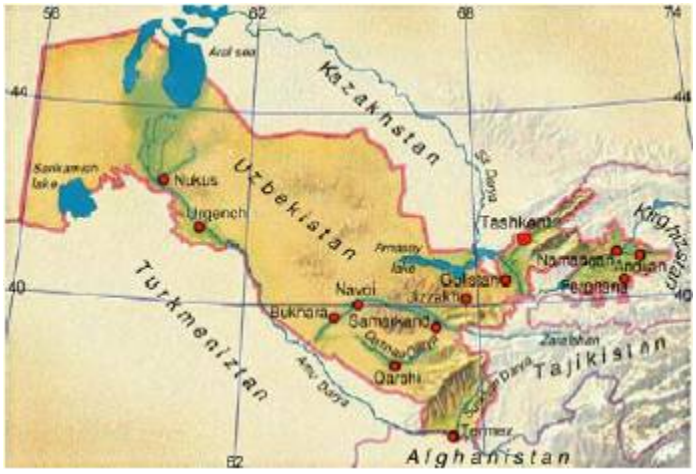


Figure 1: Location of the Republic of Uzbekistan

2. The country accounts for one-third of the region's population, amounting to over 29.6 million people. Despite steady economic growth in the last decade, the impact of economic growth on improving livelihoods has been inadequate. While poverty has decreased nationwide – largely on the strength of a substantial reduction in urban areas[1] – in rural areas, where the overwhelming majority of the population is concentrated, it is falling more slowly. Thus, over the last several years the differences in poverty rates between rural and urban households have increased, rising from 8 percentage points in 2001 to almost 12 percentage points in 2005/6. Disparities in economic and social development alike remain wide between not only rural and urban areas but also between regions of the country. Poverty in Uzbekistan has distinct rural and regional dimensions. Nearly 3 out of 4 poor people live in rural areas; 47% of the southern provinces are classified as poor, and 27% as extremely poor. This geographic distribution of the disadvantaged population highlights the large differentiation in poverty rates between the regions, as well as fundamental differences between Tashkent city, in particular, and other regions of the country. In 2006, the ratio of GDP per capita of the poorest and richest regions – Karakalpakstan, with 44% poor, and Tashkent city, with only 6.7% – was nearly 1:6. One reason for the widening "development gap" is that economic growth since 2001 has occurred mainly in regions with a strong manufacturing sector, extractive industries and modern services.

3. Unemployment rates are high, with 250,000 persons entering the labour market annually. This mainly happens due to the release of workers mainly from the agricultural sector as a result of the dismantling of *shirkats* (cooperative entities bringing together farmers and agricultural producers, which replaced liquidated Soviet collective farms and state farms). Unemployment is officially extremely low – in 2006, just 4% of the labour force – although independent estimates by international organizations are four to fivetimes higher. Overall, women make up more than 67% of the unemployed and on average are unemployed for more than a year. In short, poverty is related not only to unemployment but also underemployment, low wages, low productivity and temporary employment. Underemployment in the agricultural sector is particularly significant, which is important given the fact that more than 3 in 4 residents of Uzbekistan are rural-based.

[1] The share of the disadvantaged urban population fell from 22 percent in 2001 to 18 percent in 2005.

4. The predominately rural profile and over-dependence on agriculture makes the country highly sensitive to climate variability and long term climate change. The poorest in the most arid parts of the country will be hit the hardest and urgent adaptation measures are required,including drought early warning systems in the face of an anticipated climate change induced increase in the frequency and severity of drought; farm-based improvements (more water efficient practices and technologies) to enhance water productivity and hence incomes, as well as the status of the natural capital being managed; and landscape level adaptations aimed at sand stabilization for moisture retention and recovery of native vegetation to reverse climate influencederosion and land degradation processes. The project will be focusing on an adaptation strategy incorporating these elements for Uzbekistan's most marginal and vulnerable region, where the poorest parts of population reside, and who are fully dependent on climate conditions and the natural resource base for their subsistence.

Current Climate

5. Whilst the terrain of Uzbekistan is mostly flat and arid (the plains), there are also a number of agriculturally-important river valleys (namely, the Amu-Darya, Syr-Darya, Zarafshon and the FerghanaValley), mountainous areas in the east and the shrinking Aral Sea in the west[i]. This varied topography has resulted in highly variable climate and rainfall patterns throughout the country. Rainfall in the plains, for example, ranges between 80-200 mm, whilst in the mountainous zones it ranges between 600-800mm annually. Most of the country is, however, characterised by aridity – according to the UNEP aridity index[2], most of Uzbeksitan's territory is classified as a drought zone, suseptible to land degrdation and desertification[ii]. The Kyzylkum desert, the largest in Central Asia is also found within Uzbekistan.

6. Since 1951, there has been an observed trend of warming within Uzbekistan. The annual average temperature has increased by 0.29ºC since 1951, for example, with minimum temperatures increasing more than maximum temperatures[iii]. However, there are some significant exceptions to this trend, including: i) the Aral Sea, where the maximum temperature has increased more than the national average whilst the minimum temperature has remained constant[3]; and ii) mountainous areas, where warming has been lower than the national average. Nationally, there has also been an increase in the number of days with heavy rainfall yet a general trend of increasing aridity has been reported[iv]. Previously, wet/dry cycles occurred every 8-10 years, however this variability is now practicallyan annual event[4]. Uzbekistan, as other Central Asian countries, is subject to localised and anomalous climate patterns largely due to the effects of air masses moving over the mountainous zones. This often results in heavy rains and flash flooding. The considerable variation in current climate across the country suggests that regions and oblasts will find themselves subject to different impacts under future climate change, and thus adaptation responses will need to vary country-wide. These localised variations highlight the need for improved local data for improved forecasting and climate modeling.

7. Snow cover has decreased in mountainous areas since the 1950s, which is likely a result of the increase in air temperature. A reduction in snow cover is dependent on numerous factors, such as: i) air temperature ii) precipitation iii) solar radiation iv) cloud cover and v) evaporation[v]. It has been calculated that an increase of just 1ºC would result in a reduction of one third of the glaciers in Central Asia (CA)[vi]. Glacial observation began in the 1950s, however, little on-the-ground data collection has been undertaken in the past two decades. Although climate-related impacts on glaciers will vary across Uzbekistan, it is predicted that the large Tien Shan glacier is likely to decrease by 35% by 2020, with considerable consequences for water security[vii].

[2]The UNEP aridity index is based on the ratio of rainfall to potential evapotranspiration (Middleton & Thomas, 1992, 1997).
[3]This anomaly is due to the considerable loss of area of surface water of the Aral Sea.
[4]Scientific and Production Water Resources Sector (SANIRI).

Water

8. Water resource management is already a key development challenge in Uzbekistan. Demand will continue to rise and climate variability and climate change impacts are likely to reduce the water supply of the country considerably. Freshwater sources in Uzbekistan consist of surface runoff of rivers, glaciers, groundwater, lakes and dams. However, almost 90% of the country's water resources originate from mountain catchments located in neighbouring countries[viii]. Regional water-sharing is therefore a major constraining factor to sustainable water supply in Uzbekistan. In addition to the inherent scarcity of water within Uzbekistan, there is a critical issue of the over-abstraction of existing water resources. Water use by the agriculture sector from surface water sources constitutes 93% of overall water use[ix], even though only 10% of the total land area is cultivated[x]. Of this cultivated land, 95% is irrigated by the two major river systems, the Amu Darya and the Syr Darya, both of which flow into the Aral Sea[xi]. In fact, the extraction of water from rivers during dry years is 100%, leaving no water to flow into the Aral Sea[xii]. Furthermore, water is used in a unsustainable manner, much of it going to hydrophilic crops such as cotton and being wasted due to ageing infrastructure (at least 50% of water losses are as a result of damaged infrastructure[5]). Integrated Water Resource Management (IWRM), multiple water uses and at least partial movement away from cotton crops are of critical importance in Uzbekistan. And the recent government policies shape that change.

9. Water shortages are common in Uzbekistan. During 2008, there was low water availability, which led to numerous artificial lakes in Karakalpakstan drying up, villages being left without water and livestock dying. Consequently, water was provided to villages via vehicles. Indeed, villages are sometimes relocated as a result of water shortages –in fact this occurred in the project target area, Karakalpakstan. The government has acknowledged that public awareness on water shortages and the need to save water are critical. The government is considering using drainage water to augmentwater supplies, however this source has a high salt content and still requires mixing with freshwater. Furthermore, underground water resources have a high mineral content and are unsafe as a drinking water source.

Agriculture

10. *Irrigated land* forms the basis of agriculture in Uzbekistan and as the population has increased, water resources have become exhausted, whilst the area under agriculture has remained the same. Within Central Asia there are 8 million ha under irrigation, of which 4 million ha are found in Uzbekistan.Agriculture accounts for 25% of national GDP and provides employment and livelihoods for about 28% of the population. Up to80% of thefood requiredby the populationis currently produced in the country.Cotton and wheat are the main crops that are grown at present; on 42.2% and 41% of irrigated land respectively[xiii]. A major cause of declining agricultural productivity is inappropriate irrigation and under-maintained drainage systems, which together increase salinisation and water logging and undermine the fertility of arable land. This degradation of the resource base is estimated to cost approximately $1 billion annually in foregone economic output[xiv]. As such, appropriate water efficient climate adaptive interventions are likely to prove to be cost effective from both farm based (financial) and national (economic) perspectives. Climate variability and change impacts are already affecting agricultural productivityand are likely to continue to do so unless coordinated adaptation measures are implemented. For example, during 2009, cotton had to be replanted four times during spring because of excessive rainfall, with significant economic consequences. Had weather forecasting been more accurate and/or the dissemination more effective, these losses would likely have been mitigated.

11. *Livestock production* is a primary source of investment for many people in Uzbekistan, as

[5]Head of the Water Inspectorate in Tashkent on 8 September 2011.

livestock is a favoured investment means as opposed to putting money in the bank. However, it is not a major economic driver nationally, as 98% of Uzbekistan's dairy cattle are owned by subsistence farmers (largely in arid landscapes), with the rest under commercial farming. Climate variability and change are anticipated to reduce pasture productivity and will therefore impact on dairy production and therefore on the investments/savings of much of Uzbekistan's population, especially the rural poor.

12. Rangeland degradation also has an anthrogentic driver. Prior to the end of the Soviet era, Uzbekistan cattle would often be herded into pastures of neighboring countries, as pastures in Uzbekistan were not sufficiently productive. However, this can no longer be done today, as people can no longer cross borders freely; consequently the pastures in Uzbekistan are subject to overgrazing and resultant degradation. Currently, there is no rangeland management system to control these activities. As the situation worsens, farmers tend move further into marginal areas and to replace sheep with goats, which unfortunately completes the total denudation of land due to the pattern of root grazing by goats, leaving it susceptible to wind action[xv]. Overgrazing of marginal land is particularly concentrated in the vicinity of settlements and around wells.

13. Climate change is likely to further decrease the resilience of rangelands, reduce water availability and lead to greater animal concentrations around water sources. This will likely perpetuate the cycle of overgrazing as farmers overstock lands and do not allow stressed land to recover. One way to adapt to climate variability and change in this industry is to increase productivity and to reduce livestock density. This can be done by communally controlled rotation management and pasture rehabilitation and fodder production to mitigate the effects of drought related shocks. In this way, two key objectives are achieved: i) milk and meat production is maintained or even increased and ii) the pastoral ecosystem is protected from overgrazing and is made more resilient to the impacts of climate variability and change.

Climate Change

14. Climate variability and change and climate-related disasters pose serious threats to the environmental and socio-economic systems of Uzbekistan. Key challenges for Uzbekistan include:

- Decline in water supply and water quality caused by:
    - → over-intensive irrigation and abstraction of water
    - → increasing temperatures
    - → changes in rainfall patterns
- Reduction in agricultural productivity caused by:
    - → unsustainable agricultural practices[6]
    - → salinisation of land
    - → extreme weather events
    - → changes in rainfall pattern
    - → increasing temperatures
    - → early arrival of spring, increased spring rainfall and hotter summers
    - → changes in ecological and agro-hydrological zones

Root causes – climate-related

[6]Examples of unsustainable agricultural practices are over-intense irrigation and no crop rotations.

15. Climate change is likely to impact the water, agricultural and health sector in numerous ways, with severe socio-economic consequences for Uzbekistan (Table 2). Without implementing adaptation measures as part of the core development policy, strategies and plans, these consequences are likely to be significantly exacerbated over time.

Table 1. Climate change-related root causes and likely impacts in Uzbekistan under the'business-as-usual' approach

Climate-related root causes	Impacts
Increase in air temperature	- Decrease in snow cover and increase in snow melt - Changes in water supply: → Earlier spring floods → Reduced water during growing season → Increase in runoff variability - Decrease in water quality - Increase in evaporation particularly in arid areas - Increase in salinisation of fresh water sources - Decrease in agricultural productivity, particularly wheat and cotton (cotton is particularly vulnerbale to temperatures above 30ºC[xvi]) - Increase in land degradation - Decrease in pasture productivity and livestock productivity, particularly Karakul sheep (thermal stress will also impact on sheep[xvii]) → A decrease in forage of 20-40% due to increase in temperature and early arrival of spring[xviii]; - Increase in pest outbreaks - Increase in late spring and early autumn frosts[xix] - Biodiversity impacts: → Decrease in forest cover → Change in range of Steppe fauna → Stressed riparian and water ecosystems → Continued impacts on the Aral Sea
Changing rainfall patterns	- Increase in drought frequency - Increase in floods and flash floods - Resulting in loss of life and property - Decrease in water volume in catchments and reservoirs particularly the Amu-Darya basin and the Aral Sea - Decrease in agricultural productivity - Increase in soil erosion, leading to degraded agricultural and grasslands
Extreme events a) Heat waves b) Intense rainfall c) Prolonged droughts	a) Increase in heat waves, resulting in: - Decrease in water supply and quality - Decrease in cotton and livestock productivity - Increase in heat strokes b) Increase in intense rainfall events, resulting in: - Increase in flooding events - River bank erosion - Damage to infrastructure - Soil erosion

	c) Increase in number of prolonged droughts, resulting in: - Decrease in water supply and quality - Decrease in grain and livestock productivity

Thepredicted increase in temperature, change in rainfall patterns and increase in extreme weather events are likely to have a severely negative. The knock-on effects are numerous and will impact: i) the water supply and water quality ii) agricultural potential and livestock productivityiii) human settlements and iv) ecosystems.

16. It is expected that runoff will change due to both glacial melting and changes in rainfall pattern. Small watercourses and the Amu-DaryaRiver Basin will be particularly vulnerable to a decrease in run-offxx. Although a decrease in run-off is expected in the long-term, in the short-term an increase in run-off variability is expected. This increase in variability will likely result in earlier spring floods and a decrease in run-off during the growing seasonxxi; both of which will have significant impacts on agriculture. At the same time, an increase in groundwater consumption in some regions is anticipated as a result of climate variability and change, which are expected to lead to secondary salinisation, land degradation and a reduction in crop yield. Unfavourable crop yields are expected throughout Uzbekistan and by 2030 there is likely to be a 2-5% reduction in yieldxxii, with the Syr-Darya and Amu-Darya river basins being particularly impacted. By 2050, cotton and wheat yields are expected to decrease in the Syr-Darya by 11-13% and 5-7%, respectively, and in the Amu-Darya by 13-23% and 10-14%, respectivelyxxiii. As a result of these climate-related reductions in agricultural productivity, it is predicated that there could be a production deficit of 10-15% by 2050. Clearly, there is an imperative to shift to more water efficient crops and practices.

17. Agriculture is indeed identified as the most vulnerable sector to the anticipated impacts of climate change. Second National Communication (SNC) of Uzbekistan states that climate change is likely to cause shrinkage of agricultural land as a result of a rise in land salinization exacerbated by higher evaporation rates, intensified land degradation and desertification processes, severe water shortages, leading to the reduction in agricultural crop productivity and yields, and threatening national food security. Agriculture is a central sector of Uzbekistan's economy; And although agricultural reforms have been underway since 2000, including the establishment and development of private farms, a result of whichhas been observed growth in agricultural production in Uzbekistan, climate change poses the serious threats to the sector and demands urgent additional measures for adaptation, as business-as-usual methods and approaches will fail to maintain the productivity of farming systems and will drive the most vulnerable and arid parts into a greater poverty and disparity with the rest of the country.

18. The climate change impacts detailed in Table 2 will not act independently of each other. In fact, their interwoven effects (combined with anthropogenic pressures) will affect vulnerable sectors within Uzbekistan in complex ways. The agriculture sector, for example, will be affected by increasing temperatures, changing rainfall patterns, drought, extreme climate events as well as an overall decrease in water availability. Table 3 highlights the many ways in which climate change is likely to impact Uzbekistan’s agriculture sector.

Table 2. Likely impacts of climate change on the agriculture sector in Uzbekistan

Climate change effects	Consequences for the agriculture sector
Increase in temperature	- Increase in evapotranspiration rates - Reduction in soil moisture - Shift in humid zones - Change in cropping patterns

	- Decline in crop productivity of some crops, yet an increase in productivity of others - Increase in pests - Lower pasture productivity - Decrease in natural grasslands - Decrease in livestock productivity - Increased incidence of agricultural pests and crop diseases
Changing precipitation patterns	- Flooding of crops - Crop damage due to increased frequency of hail storms due to climate change - Increase in land degradation - Increase in soil erosion because soil absorptive capacitycannot accommodate inceasing rainfall intensities
Drought	- Increase in stress on irrigation systems - Decrease in agricultural productivity - Decline in available pastures - Decrease in watering holes - Lower livestock productivity
Extreme climate events	- Increase in mudflows and flooding in agricultural production areas - Increase in soil erosion - Increases in the frequency and intensity of droughts

Root causes – non-climate-related

19. Exacerbating the climate variability and change-related threats are numerous anthropogenic activities that reduce Uzbekistan's resilience to withstand climate variability and future climate change impacts. Non-climate-related challenges include: i) environmental degradation ii) unsustainable agricultural practice; and iii) water stress, which are detailed below.

i) Environmental degradation

20. The impacts of climate variability and change will exacerbate existing environmental degradation.This has in part been caused by outdated policies, legislation and minimal government support in the form of extension advice on land management practices. Importantly, degradation of flora and fauna and depletion of natural resources caused by deforestation and expansion of cultivated lands have led to the deterioration of ecosystems, desertification and biodiversity losses. Furthermore, unsustainable land management practices have resulted in soil erosion and salinisation, which has significantly affected the productivity of agricultural lands and pastures.

21. There is sufficient evidence to indicate that Uzbekistan would benefit from improved monitoring and forecasting for agriculture. This would in particular assist farmers to improve the timing of fertilizer application, control pest and disease outbreaks, and avoid over-application of inputs which raise costs and exacerbate environmental damage[xxiv].

ii) Unsustainable agricultural practices

22. A legacy of centralized policies is water management and agricultural practices which are not suitable for local circumstances and resource availability. For example, large irrigation-dependent cotton cultivation wasintroduced during the Soviet era in Uzbekistan in spite of the limited water resource

availablility, resulting in an accelerating decline in water supply and levels. Since the end of the Soviet era, there has been, on the one hand, a rapid transformation towards a market economy;but on the otherthere is now an absence of integrated and systematic planning for agriculture.

23. Agriculture is still largely state-controlled and governed by government policy or state decrees. Recent decrees include the following: during the winter of 2008/09, the government ordered farmers to grow fodder[7], as livestock were dying; to place 3000 ha of land under drip irrigation; to construct green houses in all districts and; to increase grace loans for drip irrigation. These are clear policy directions indicating the government's understanding that the current water use and agricultural practicies cannot be sustained given climate related stress. However not all decrees contribute to sustainable agriculture nor to longer term adaptation. For example, farmers expand their plantation areas during particularly dry seasons in order to fulfil state plans and consequently water consumption and use of inputs increases[xxv].

24. During the Soviet era, farmers farmed on large collective farms, which were irrigated by extensive drainage canals. However, following the break up of the Soviet era, farms were divided up into smaller plots and farmers were left to manage the infrastructure on their own farms. As a result of a lack of finance, many farmers do not maintain the infrastructure, which leaves less water available for farmers "downstream" along the irrigation canal (e.g. because of water leaks and over watering). Consequently, irrigation canals do not serve these smaller farms well, as they tend to be at the end of the system. At least 50% of water losses are as a result of damaged infrastructure. Presently, the government is looking to upgrade the irrigation infrastructure and increase farm size in order to improve efficiency and reduce land degradation.

25. As a result of the slow rate of change in the agriculture sector, agricultural practices have remained similar to that during the Soviet era. As a result there is over-abstraction of water continues and over-irrigation of land continues; bothleadnig to in an increase in ground water mineralization, an increase in the water table and salinisation of land.

26. Currently 51% of irrigated land is considered saline[xxvi], which is a particular challenge to agricultural productivity in Uzbekistan, particularly in the "downstream" regions (for example, 95% of the lands in the lower reaches of the Amu-Darya are saline[xxvii]). Salinisation reduces cotton yields by 20-30% on slightly salinised lands, 40-60% on moderately salinised lands, and 80% or more on heavily salinised lands[xxviii]. As such, it is apparent that even moderate investments in improved water conveyance and application efficiency would be cost effective, especially when combined with flushing of salts.

27. Pastures in Uzbekistan, as in many other Central Asian countries, have been degraded by anthropogenic desertification and ecosystem fragmentation. Many areas are under-grazed, whilst those around villages are now over-grazed. The lack of browsing in currently under-grazed areas has lead to considerable changes in plant communities, including invasion of weeds and unpalatable species. For example, pasture productivity has decreased in the last decade (since 1995) by 23% (mostly in the Karakalpakstan region), whilst the number and density of cattle have increased over the same time frame[xxix]. Under climate change conditions, without appropriate adaptation interventions, land degradation and its impacts on livelihoods is likely to continue.

iii) Water stress

29. Uzbekistan has water supply deficits because water resources have not been managed in a sustainable manner. This over-use of water supplies is affecting Uzbekistan's the two main water bodies in particular (the Amu-Darya and the Aral Sea). The stress on water resources will likely increase as

[7]Farmers were instructed to set aside 0.5ha/cow if the land was irrigated and 2 ha/cow if the land was not irrigated.

climate variability and change impacts exacerbate water shortages. It is critical that water conservation mechanisms are introduced in the water sector to improve the volume of water available for other sectors and to adapt to climate variability and change.

30. Given the country's high sensitivity to climate variability and severe anticipated impacts of climate change the government has acted to consolidate land tax proceeds at the Land Rehabilitation Fund under the Ministry of Finance in order to directtargeted investments in infrastructural rehabilitation (focusing on irrigation and drainage) and land quality improvements (laser leveling, land desalinization, reclamation etc). The fund has been established by Presidential decree, with an operational validity for 2008-2012, subject to evaluation and further extensionas necessary.The Fund invests in irrigated agriculture to the value of approximately 150 billion Soms (approximately $83 million). However, millions of small scale subsistence farmers who grow their food on their small *Dekhkan* plots do not directly benefit from these massive investments and require urgent assistance to adapt to both the current climate variability and anticipated impacts of climate change.Farmers and pastoralists in the downstream, most arid regions such as Karakalpakistan are particularly vulnerable, as they often receive no water from the upstream regions, especially during the dry seasons. Karakalpakistan is the poorest and most vulnerable region to climate change in Uzbekistan.It occupies about 166,600 km^2area, about a third of the country's total land area. Yet only about 16% is most habitable – the valley of the Amu-Darya river. Karakalpakstan suffers high levels of poverty and unemployment compared to other regions in Uzbekistan.

31. The World Bank Living Standards Assessment in 2008 reported that 36.5% of the population in the region lives below poverty line, with 7.7% suffering from extreme poverty, compared to national figures at 27.5% and 9.7%, respectively. Average monthly earning is about $20 per person. Low water availability during summer, combined with very little rainfall, makes the area prone to drought conditions. Climate change scenarios for Uzbekistan indicate greater warming and aridification in this region. Because of high social vulnerabilities the region has drawn considerable attention from the government and donor community. However assistance so far has mainly focused on agricultural practices and natural resource management without due account of prospective climate change impacts and adaptation needs. Farm-based and landscape level adaptation measures must be implemented to sustain livelihoods of a growing population. At the farm level, an introduction of a range of traditional and innovative water saving and agronomic measures that support increase in land and water productivity; and a landscape restoration to maintain ecological functions and integrity necessary to sustain the agro-pastoral practices in the face of climate change are the priority adaptation solutions for large parts of arid Uzbekistan, especially Karakalpakistan. Additionally, the provision of drought risk management options such asthe quality and timely seasonal and long term forecasting and early warning; and targeted extension service geared towards drought risk management are the normative solutions for the most vulnerable agro-pastoral groups to maintain and even further develop their rural livelihoods despite climate change. However, there are number of critical barriers that need to be addressed to achieve long term adaptation in Uzbekistan - and in Karakalpakistan in particular, where the adaptation needs are pressing.

32. To summarize, the key barriers the project will contribute to overcoming are:

Barrier 1: Paradoxically, a country for which agriculture is such an important sector does not have a systematic extension service provided to itsover 100,000 agricultural and pastoral farms[8]. Furthermore, the extension services which do exist tend to favour larger farmers. Finally, extension advice does not currently take a climate change adaptation perspective.

[8]There are 66,134 farms covering 5,295,100 m hectares of irrigated lands, 105 specialized livestock farms and 28 astrakhans breeding *shirkat* farms that operate over 17 m hectares of desert pasture

Barrier 2: There is no comprehensive early warning system in place to guide water allocation and crop and pasture planning and management. Despite the strong capacity of Uzhydromet, the state department of Uzbekistan, high resolution, tailored forecast products are not readily available to potential users; sectorial ministries, various local authorities with land management responsibilitiesand farmers.

Barrier 3: Despite numerous pilot initiatives that demonstrate good agriculture and natural resource management practices, there is no government policy or financial incentives for the large scale adoption of measureswith strong adaptation value.

Barrier 4: There are no integrated land use planning and policies for landscape level rehabilitation and sustainable management to allow for the functional integrity of the arid landscapes and hence greater resilience to climate change impacts.

Project Regions and Criteria for Selection

33. Karakalpakstan is the most vulnerable region of Uzbekistan due to its unfavourable geographic location at the tail end of the Amudarya River and arid hydro-climatic conditions. It often receives low-quality and little or even no water from the upstream regions, especially during dry seasons. An analysis undertaken by the SNC showed that the number of days with 'high' temperatures (higher than 40^{o}C) increased more than twice in the Aral Sea coastal zone, including Karakalpakstan. Climate change will further aggravate the already unfavourable environmental conditions in this region. Trends of falling yields and land productivity are already observed in Karakalpakstan, requiring immediate attention and priority adaption action (see Figure 2).

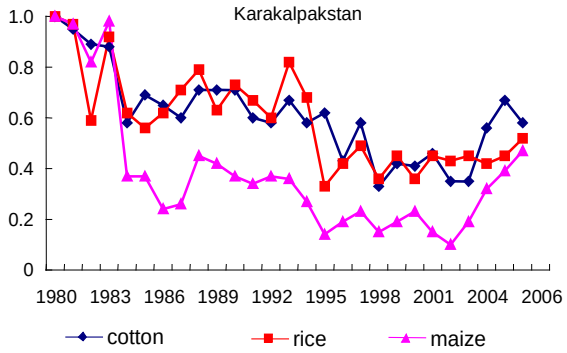


Figure 2.Trends of falling yields and land productivity

34. Karakalpakistan region consists of 15 districts, of which the most vulnerable have been identified by the project. The identification process is based in part on a quantitative analysis of factors contributing to vulnerability, as this project aims at ensuring climate resilience of local communities which will be most strongly affected by the anticipated impacts of climate change. In particular the project is focused on helping climate 'proof' livelihoods for local populations and hence takes income related variables and the degree to which they are sensitive to climate condition as key factors in this analysis. Keeping in mind the core purpose of the AF project that is in ensuring long term climate resilience of local agricultural communities by introducing the means and agricultural practices that help them withstand recurring drought conditions, the project has used the following elements of vulnerability criteria for the selection of target areas:

- Agricultural production as a proportion of total economic activity in a district
- Irrigated farming as a proportion of the total land area of the district
- Proportion of saline (low, moderately, and highly saline) land in a district

- Potable water availability per capita in a district
- Proportion of minors and pensioners in the population of the district

Additional criteria were:

- Level of interest from the local authorities and well organized *makhallas*
- Villages most affected by droughts of past decades, including by recent droughts, and which are still recovering and rely on external (government or donor) aid
- Level of poverty
- Female headed families and / or villages with majority female population.

35. The results of this multi-variate analysis, including vulnerability calculations with respect to climate change, in the form of a conditional vulnerability index (CVI), are shown asTable 4.

36. It is worth noting that the project proposal preparation team also undertook a wide round of negotiations with representatives of the Cabinet of Ministers of Karakalpakistan, district administration officials, local communities, farmers and dekhans had been undertaken.Useful recommendations and comments to enrich the project activities and to make them more effective and practicable were adopted into the project design as a result.[9]

Table 3. Factor values in the Conditional Vulnerability Index (CVI)and CVI results

#	District	Share of agriculture in GDP (a)	Share of irrigated land in total district land fund (b)	Share of saline land in the district (c)	Share of minors and pensioners in total population of the district (d)	Share of district population provided with potable water (e)	Conditional Vulnerablity Index (CVI)
1	Muynak	0,55	1,00	0,90	0,44	0,52	**0,474**
2	Kegeyli	0,37	1,00	0,90	0,44	0,64	**0,415**
3	Takhtakupir	0,40	1,00	0,84	0,49	0,82	**0,381**
4	Chimbay	0,30	0,95	0,76	0,41	0,55	**0,375**
5	Kanlykol	0,10	1,00	0,74	0,43	0,42	**0,370**
6	Amudarya	0,47	0,91	0,77	0,43	0,78	**0,361**
7	Beruniy	0,45	0,75	0,57	0,44	0,47	**0,347**
8	Kungrad	0,62	0,81	0,61	0,41	0,76	**0,337**
9	Nukus	0,46	0,88	0,70	0,43	0,81	**0,333**
10	Khodjeyli	0,38	0,80	0,61	0,44	0,59	**0,326**
11	Ellikkala	0,50	0,78	0,55	0,44	0,77	**0,301**
12	Karauzyak	0,30	0,70	0,59	0,44	0,80	**0,247**
13	Turtkul	0,44	0,51	0,39	0,44	0,63	**0,229**
14	Shumanay	0,16	0,62	0,56	0,44	0,85	**0,184**

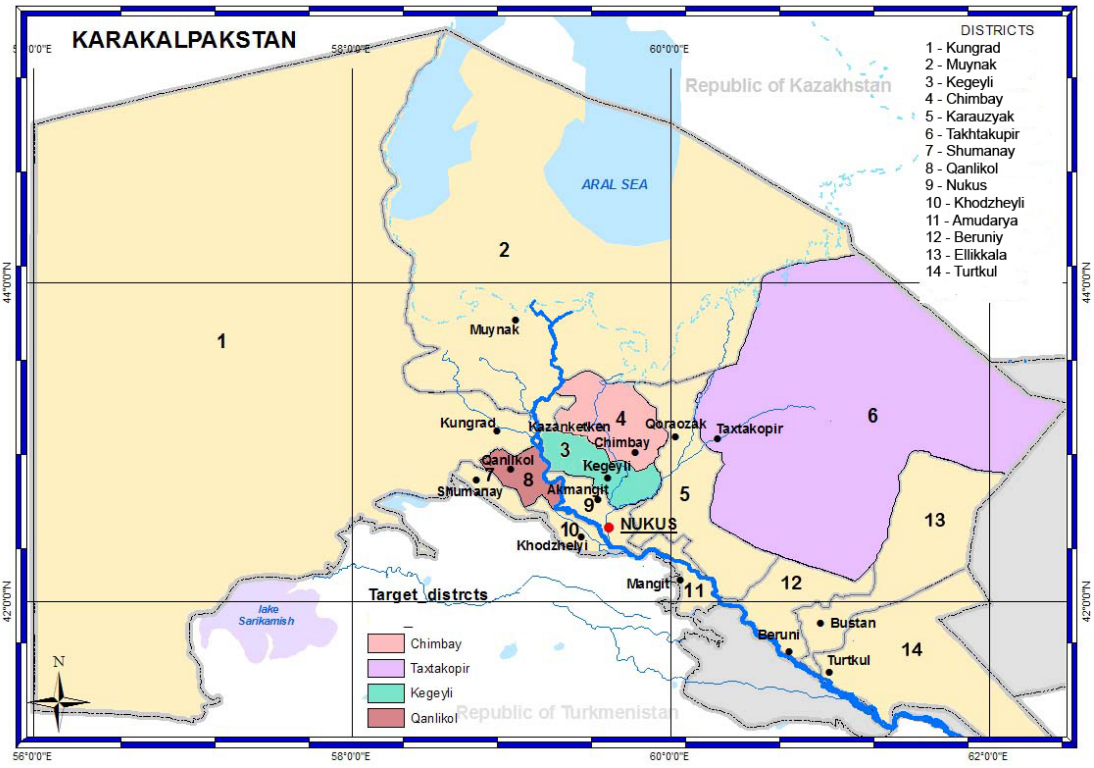
[9] A 10 days field trip to Karakalpakstan has been undertaken by national experts, supported by UNDP, to present the project objective, outcomes and outputs to the communities. During the trip government officials, representatives of Ministry of Agriculture and Water Resources, Water Users and Farmers Associations, local district authorities, makhallas, pastoralists, dekhkans and farmers were consulted.

* CVI calculation justification: CVI is calculated by following formula:
CVI=(a+b+c+d-e)/5. The larger the number, the more vulnerable district is considered to be.

37. Although Muynak district ranked most vulnerable, the project planning process also took into account the number of projects implemented since 1990 in the field of agriculture in identifying which districts should be prioritized. As Muynak has already benefited from 19 projects out of 53 projects in the area, it was not included for all the project activities. However, as this district is disproportionately affected by blown sand, it is still included under the component 3 that deals with sand stabilization and landscape restoration works in.

38. As the result of consultations and the vulnerability analysis, a map of targeted districts had been generated (see Fig.3).The characteristics and location of each district are described below.

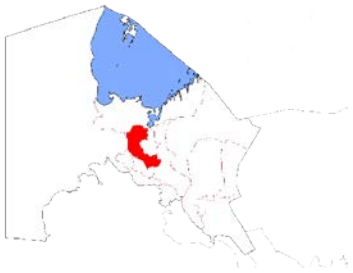
Figure 3.Map of the targeted districts



Kegeyli District

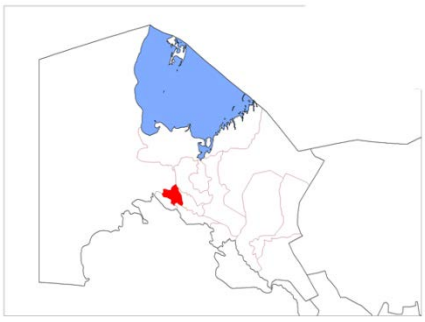
39. This region lies in the centre of the territory of Karakalpakstan. Inhabited by approximately 83,000 people, the region practices farming and agro-pastoralism and is spread across 260 301 ha, of which 120,219 ha (46,1%) is employed for agricultural uses. More than half of that area (64,948 ha) comprises pasturelands. The northern villages of Kegeyli (a target areas) engages in livestock production due to the virtual unavailability of water resources (located, as it is, downstream). In this area almost 85% percent of population is involved in pastoralism. The average income per capita is approximately $20-30. The farmers of southern part of district are involved in cultivating cotton, wheat and rice. The average

farm size is over 100 ha. Livestock production is a primary source of investment for the village populations, as livestock is a favoured investment. In a drought year the working age population formerly migrated to neighboring countries for wage employment. The project aims to promote collective forage production and capacity building in the target areas in order to prevent livestock assets from being significantly affected during drought. In short, Keyegi is one of the most vulnerable districts of Karakalpakstan to climate change and drought.



Kanlikul district

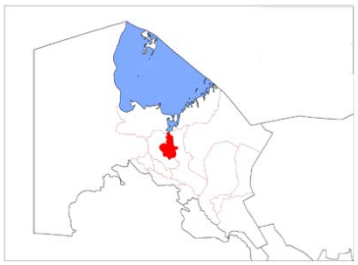
40. This district lies near the south border of Karakalpakstan with Turkmenistan. It is inhabited by approximately 45,000 people, who mostly practices farming together with some agro-pastoralism and comprises 74,409 ha, of which 46,406 ha (62%) are currently allocated to agricultural practices. Of this total 13,166 ha are used as pastureland and 32,855 hectares for farming. There are 164 farms, 149 of which deal are under crops such as cotton, wheat and vegetables. The average size of farms is more than 100 ha. Kanlikul is one of the most vulnerable districts of Karakalpakstan to wind erosion and drought, in light of its proximity to the Kyzylkum desert.



Chimbay district

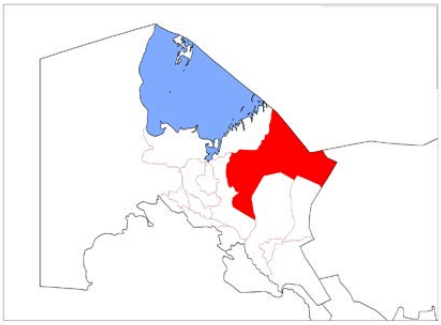
41. This district lies in the northern area of Karakalpakstan. It is inhabited by approximately 29,000 people, the region practices farming and agro-pastoralism, and it comprises 219,831 ha of land, of which 131, 450 ha (59.7%) are under agriculture. Of this more than 60% (80,625 ha) are used as pastureland. The western part of Chimbay (the target areas) borders Kegeyli region, where most of the population practices pastoralism and here also is important in the socio-economic profile of the local communities. In fact in these areas more than 80% percent of the population involved in pastoralism. The farmers of the southern part of district are involved in cultivating the cotton, wheat and rice, as they have more access to water resources. The average size of farms is more than 60 ha for farming and more than 100 ha for pastoralists. Livestock production is a primary source of investment for the village people, as livestock is

a preferred investment. However overgrazing has had significant impacts on land productivity and the ecosystem. The reduction of livestock per capita reflects this, with impacts on livelihoods.



Takhtakupir district

42. This district lies in the northern part of Karakalpakstan and borders Kazakhstan to the north and the Karakum desert to the east. It is inhabited by 38,800 people. The total area of the district is 2,112,218 hectares. Approximately 1,463,805 hectares used for agricultural purposes, of which, 1 430 285 ha (97%) are pastures. Only 32,684 hectares (in the south) is used for crop farming. Given the location, the northern and eastern parts of the district have a very low availability of water resources and therefore the main income of local communities is from sheep and goat grazing. However, the reduction of productivity of pastures, which will be exacerbated by climate change, makes the local people more vulnerable. In the southern part of the district both pastoralism and farming is practiced. However farming in the southern part of the district is affected no less than northern part on account of moving sand dunes from the Karakum desert, which have buried most irrigated lands and resulted in increased salinisation. The project aims in this area not only to scale-up the best tested methods of agriculture but also to protect irrigated land from being buried by sand encroachment and simultaneously improve the productivity of pastures by planting saksaul and tamarix, which can also improve the incomes of pastoralists, who use them as fodder during drought.



PROJECT / PROGRAMME OBJECTIVES:

43. The frequent occurrence of drought, an overall trend of aridification and projected drying of Uzbekistan's poorest region, Karakalpakstan, place serious strains on water availability, is causing a decline in land productivity and in turn ofthe ability of rural poor to withstand the current and future impacts of climate change. Despite considerable infrastructure investments in the agricultural sector and progressive reforms socially, vulnerable farmers and pastoralists that reside in arid and marginal lands do not benefit directly from these improvements. Urgent attention and tailored adaptation support is needed to propel the positive reform processes in the sector alongthe adaptation trajectory and at the same time reach out to the poorest and most marginal for urgent adaptation solutions. As such, the overall **objective** of the proposed project of the government of Uzbekistan is to develop climate resilience of farming and pastoral communities in the drought prone parts of Uzbekistan, specifically Karakalpakstan.

44. With a view to achieving this objective the following interconnected **outcomes** will be achieved through the proposed project:

1. The institutional and technical capacity for drought management and early warning developed

2. Climate resilient farming practices established on subsistence dekhkan farms

3. Landscape level adaptation measures for soil conservation and moisture retention improvesclimate resilience of over 1,000,000 ha of land.

4. Knowledge of climate resilient agricultural and pastoral production systems in arid lands generated and widely available

45. Through outcome 1 an improved hydro-meteorological monitoring infrastructure will be in place, which will serve as the backbone for a drought early warning system. This in turn will both provide short timeframe benefits in terms of weather forecasts of a spatial scale of use at farm level, and in a timely manner, but also lay the foundation for monitoring weather patterns over the seven year life of the project and beyond, through which modeling of climate change impacts can be empirically informed. This service will be complemented by a suite of adaptive multi-benefit agronomic practices for crops and livestock for the targeted (80% small, 20% medium size) farms / farmers under outcome 2. These measures which range from conservation agriculture through horticultural greenhouses and include pasture management, will help farmers manage the effects of climate change in ways which diversify their livelihoods and increase their incomes.

46. All this will be represented in a scenario based land use plan developed in a participatory way as part of outcome 3, through which the project complements the farm support activities of outcome 1 and 2 with a landscape wide functional ecology approach, which seeks to reduce the impacts of higher temperatures and lower rainfall in the form of windblown sand onto farmland as well as the direct effects on crop production. This will be primarily in the form of large scale plantations of trees proven to have multiple ecological and economic benefits and employment and skill/knowledge opportunities will be created through community engagement in the planting activities. Finally the key lessons from the project will be monitored, documented and disseminated with respect to outcome 4, in order to maximize project impact and sustainability through exposure to a wide public through the media, as well as targeted products for decision makers to encourage evidence based decision making. This will be done in conjunction with local and national institutions of excellence.

47. Overall, it can be seen that the 4 outcomes are logically interrelated and they have also been designed to mutually reinforce each other. They also reflect priorities stated by the governments of Uzbekistan and Karakalpakstan, as well as derive from consultations from the future project beneficiaries. They are also informed by a review of what has and has not worked in Uzbekistan and the region based on both government and other project activities, as well as being cognizant of social and market tends as well as the general evidence for an effective aridification through climate change effects in the area of Uzbekistan which is already the most drought prone as well as having the lowest socio-economic indicators.

48. In short, from an adaptation perspective, the improved weather monitoring and climate modeling capacity, together with a more effective early warning system, will put this most vulnerable region of Uzbekistan on a more solid footing in terms of identifying the local effects of climate change and taking these into account in land management decisions at various levels. This capacity will be reinforced by awareness of more adaptive crop and livestock options and demonstration of their effectiveness. A wide range of water efficient agronomic practices and locally adapted technologies will be implemented, improving income levels and livelihood diversification, all of which improves resilience at the household level. For example, horticultural greenhouses will both reduce the impact of droughts by creating a managed micro-climate as well as extend the growing season, significantly enhancing net revenue. This will be complemented by enhancing the resilience of the ecosystem within which agriculture and livestock keeping takes place, with benefits such as increased soil depth, leading to better water flux management, as well as through reduction in environmental 'pollution' in the form of windblown sand deposition on fields.

49. Just as importantly, the capacity to model climate change impacts and take them into account in planning, as well as improved understanding at field level through an extension service strengthened by delivery of a proven farmer climate field school curricula, will increase the adaptive capacity of the region to identify and implement climate change solutions in the future and, the process, inspire similar activities elsewhere in the country. All of this responds a number of key barriers identified in Uzbekistan's Second National Climate Change Communication, but in particular the barrier of lack of applied research and development which connects climate change impact assessment with other environmental and socio-economic challenges. Finally, the proposal is fully in line with the Adaptation Fund's portfolio level objective 1, 'to reduce vulnerability to the adverse effects of climate change, including variability at local and national levels.

PROJECT / PROGRAMME COMPONENTS AND FINANCING:

PROJECT COMPONENTS	EXPECTED CONCRETE OUTPUTS	EXPECTED OUTCOMES	AMOUNT (US$)
1. Institutional capacity and mechanisms for drought risk management and early warning	1.1. Upgraded observation and monitoring infrastructure (e.g. 2 Doppler water meters, automatisation of 8 met stations) for effective data receiving and transmission (US$671,000)	1.1.1. Institutional and technical capacity for drought management and early warning developed	**1,257,000**
	1.2. Multi-moduleplatformfor integration of data flow from hydro-meteorological observation network to end users (US$368,000)		
	1.3. Drought early warning mechanisms (indicators, gauges, warning distribution mechanisms etc) to minimise impacts of droughts in place and functional(US$160,000)		
	1.4. Science-based extension services for subsistence dekhan farmers established to assist in farm-based climate risk management, including sub-district, community level ClimateFieldSchool / Extension (CFS /E) for direct outreach to farmers and localized training in adaptation practices (US$58,000)		
2. Climate resilient agricultural and pastoral production systems	2.1. 40,000 Dekhkan farmers have adopted climate resilient conservation agriculture practices (e.g. low till, mixed cropping, fodder production, and residue crop soil covering adopted measures adopted at 80,000 ha of dekhkan farms) (US$456,200)	2.1.1. Climate resilient farming practices established on subsistence dekhkan farms of Karakalpakistan	**1,377,400**
	2.2. 40,000 Dekhan farmers have adopted water saving irrigation practices (e.g. land levelling, well management, furrow and drip irrigation systems adopted at 80,000 ha dekhkan farms to improve farm-level drainage and minimise salinisation)(US$482,700)		

PROJECT COMPONENTS	EXPECTED CONCRETE OUTPUTS	EXPECTED OUTCOMES	AMOUNT (US$)
	2.3. 40% of targeted dekhan farmers have established horticulture greenhouses on 20,000 ha of farms to minimise impacts of droughts on farm production(US$338,500)		
	2.4. Legal and regulatory framework put in place to support well tested farm-based adaptation measures for replication and upscale (US$100,000)		
3. Landscape level approach to adaptation to climate change risks of increased aridity	3.1. Local saksaul and tamarix plantations deliver sand stabilisation and soil desalinisation function for 1,042,094 ha of farm and adjacent farmlands, based on wind models and comprehensive landscape rehabilitation and management plan (US$1,107,200)	3.1.1. Landscape level adaptation measures for soil conservation and moisture retention improves climate resilience of 1,042,094ha of land	**1,723,900**
	3.2. Community management scheme for planting and maintenance established as community employment scheme for landscape level adaptation(US$174,500)		
	3.3. Cooperative management for landscape rehabilitation and management established to enhance community control and ownership arrangements (US$442,200)		
4. Knowledge management and awareness raising	4.1. Inventory of all tested agronomic and water saving measures to map out successful practices (US78,400)	4.1.1. Knowledge of climate resilient agricultural and pastoral production systems in arid lands generated and widely available	**273,400**

PROJECT COMPONENTS	EXPECTED CONCRETE OUTPUTS	EXPECTED OUTCOMES	AMOUNT (US$)
	4.2. Analysis and lessons learned for climate resilient agricultural and pastoral production systems in arid lands documented and disseminated through printed and web-based publications (US$135,000)		
	4.3. Quarterly farm and pasture land demonstration meetings with participation of national, local authorities, media and communities delivered (US$60,000)		
5. Project/Programme implementation total cost			4,631,700
6. Project/Programme Execution costrequested from AF[10]			359,178
7. Total Project/Programme Cost			4,990,878
8. Project Cycle Management Fee charged by the Implementing Entity (8.5%)[11]			424,225
Amount of Financing Requested			**5,415,103**

[10]AF funding is requested to cover USD 359,178 (= 6.6% of total project cost; or 64% of the total project execution costs), with UNDP Uzbekistan contributing USD 200,000 as co-financing. The project will not be charged for the DPS cost-recovery as all DPS costs will be covered from the UNDP co-financing. Total project execution costs: USD 559,178. Please, see Annex 3 for more details.)

[11] 8.5% of total project implementation costs; see detailed breakdown of services provided by MIE fees in Annex 2

PROJECTED CALENDAR:

MILESTONES	EXPECTED DATES
Start of Project/Programme Implementation	May, 2014
Mid-term Review (if planned)	May, 2017
Project/Programme Closing	May, 2020
Terminal Evaluation	February, 2019

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: Institutional and technical capacity for drought management and early warning developed

50. The Centre of Hydro-meteorological Service of Uzbekistan (hereafter referred to as the Uzhydromet) is the lead agency for coordinating adaptation work in Uzbekistan. Its network includes 400 stations, including gauging stations desinged for meteorological, agrometeorological, hydrological and other observation tasks. Despite the impressive number of stations that make up the observation network of Uzhydromet, only 7 are automated and the rest has been operated manually. Manual operation significantly hinders efficiency of the observation network (timeliness of measurement data collection and transmission, high net costs and problems of human tampering). Moreover, manual observations are no longer able to meet the growing demands for hydrometeorological and climate services. Considering that the hydrometeorological and climate monitoring network is an integral part of the existing Early Warning Systems for Hazardous Hydrometeorological Phenomena (EWSHHMPs), the network is subject to additional requirements to meet the EWSHHMP information needs in the context of climate change, which makes manual observation inadequate.

51. The centre has strong technical capacity and long record of observation practice. Climate forecast information is issued by Uzhydromet to provincial agricultural offices, which in turn disseminate information to district offices and on to farmers. Hydrological forecast is issued by Uzhydromet to provincial agricultural offices, which in turn disseminate the information to water distribution point centers, and on to water user associations and farmers.However, with climate change,additional data-sets and information are needed as well as additional requiremens for technical skills for data collection, processing and trasmission are to be met. Ministry of Agriculture and Water Resources (MAWR) will require processed information on run-off formation; water levels in reservoirs; and moisture content in soil in the main agricultural provinces. For example, during the drought of 2000-2001 the most dramatic cutbacks in agricultural production were due to a lack of planning, prognosis, and water control at the regional, national, and local levels on the Syr Darya and Amu Darya Rivers, which resulted in shortfalls in supply of 20-30% in mid-stream areas and 35-80%. Consequently, around 200,000 farms (1,000,000 people) lost crops, which the Ministry of Economy estimated at $50 million damage to agriculture in 2000.

The damage of this scale could have been avoided had there been advanced methods, tools and hardware in place for timely detection and warning.

52. Seamless use of weather and climate information of different time scales, along with hydrological forecast is needed to guide crop and livestock management decisions in responding to increased climate variability. Currently, Uzhydromet generates seasonal (3 months lead time, updated monthly), medium-range (6 days), and weather (3 days, provided daily) forecasts of temperature and precipitation, with 25 km spatial resolution. There is scope to improve forecast resolution in collaboration with Regional Integrated Multi-Hazard Early Warning System (RIMES), which has capability for 9 km resolution forecasting. The project fully intends to leverage this opportunity, as it would represent a sufficient combination of spatial and temporal resolution to be of practical value to farm level decision making.

53. The bases for early warning dissemination include the seasonal forecast that provides an indication of temperature and precipitation behavior during the course of the season. Uzhydromet also provides hydrological forecast twice a year: autumn-winter forecast provided in September, and spring-summer forecast provided in March. Uzhydromet's agroclimatology branch uses this information in preparing province-specific advisories on periods of planting and harvesting for various crops within the season. Updated seasonal temperature forecast, provided 1 month in advance, is useful for making decision about water supply to irrigation network in order to mitigate impacts of extreme summer temperatures on main crops. This institutional resource will be built by making these sorts of forecast of more value through increasing the spatial and temporal resolution, in part through the automated hydro-meteorological infrastructure being put in place as Output 1.1. The main direct beneficiaries of this information are government institutions. This in turn helps leverage the capacity of government institutions to plan water resource allocation and make related decisions for the ultimate benefit of land users.

54. The medium-range forecast provides a clearer indication of a heavy rainfall within the season up to 15 days in advance. Heavy rainfall within the spring season, for example, can be predicted and provided as early warning, with 6 days lead time, for making decision to plant or withhold planting of wheat. A similar 6-day warning can be made for rain spell within autumn for guiding decision to harvest cotton before the rains come. Uzhydromet confirmed that it is possible to generate 2 week-ahead temperature forecast for Karakalpakstan. This lead time would be useful for making decisions about managing heat stress for making decisions about crop production and livestock management. Such quality forecast products will be delivered to the land users.

55. Provision of demand-driven and client oriented climate information will contribute to climate-informed agricultural practices and facilitate closer collaboration between the Uzhydromet and the agriculture and water resources department.For example using season-ahead climate and hydrological forecasts to make strategic decisions on planting as well as delineate areas for grazing and identify the maximum number of animals that these areas can support. The project will help upgrade the current monitoring and observation system in Karakalpakistan. This will mainly include Doppler water flow meters and automation of 8 hydrometeorological stations in the targeted region. This will improve the data collection and address the current issue of human tampering. The benefits of modernization of monitoring infrastructure shall spread not only to the project zones but also to other districts of Karakalpkastan, since all the districts have only one source of water supply – Amu-Darya River. The modernization is also allows to improve the early warning system which focuses on the early warning on expected drought in order to enable correcting the management of available water resources, including operation mode of the key reservoirs.It will also develop the information platform and tools for providing hydrometeorological services in a timely and accessible manner for key end users (sectoral ministries and their planning departments, water user

and farmer associations, extension services and community groups). Existing staff and budgetary allocations for the Hydroment state department will ensure the adequate maintenance as it is already practiced across its network. The project will also help establish a robust climate information delivery and feedback mechanism, integrate climate information in decision-making processes and generate climate information that is tailored to the requirements of the user. This will build on the current institutional arrangement for information delivery, and build capacity for translating climate information into potential impacts and corresponding response options. Presently, climate bulletins produced by the Uzhydromet include complex technical information and are not tailored to the decision-making requirements of the key institutions. Hence the project will establish a 'multi-modal' platform/system for integration of data flow from hydro-meteorological observation to end users (output 1.2.). More specifically, the project will facilitate the integration of real time information from the hydro-meteorological network being upgraded through the project (Output 1.1) with the existing related systems being used by institutional users of this information (ministries in particular). This will be achieved through provision of technical services to assess the priority needs in the area, design an interface mechanism (data acquisition, control and dissemination system of DACDS), as well as training on the use of the system and maintenance of the system over the life of the project, with a gradual hand over to government users to ensure sustainability. This will not only provide the users with a more integrated picture of the current and prospective weather, but also assists in more timely dissemination of early warning products tailored, in this case, to the target region.

56. The system is essentially a means of disseminating information tailored to needs of end users hydrometeorological and climate information; both to the community and to the decision makers. The system will be designed to be 'multi modal' in the sense that different modules provide (i) the informational inflow (ii) the user interface to analyze and tailor this information and (iii) for dissemination of information through the institutional network to the wider number of end user, in particular the most vulnerable communities. For example, at the national level, the governing body of the Land Reclamation Fund gathers all sectoral ministries, including the Uzhydromet. This can provide for the climate risk management forum for the strategic decisions related to land and water investments in the sector of agriculture. The project will assist the Uzhydromet to process and tailor the climate risk information in a way that can steer the decisions at the Land Reclamation Fund towards greater resilience of farming systems. This will result in more efficient uses of the Land Reclamation Fund, and in particular will allow decision makers to take into account scenarios under climate change influenced weather patterns and associated impacts on water management and crop and livestock production.

57. The multi-module platform will allow integration with existing hydrometeorological and climate data dissemination facilities, and specifically interface with community which will be engendered through the Climate Field School /Extension element that will be established under this component and discussed below. The Climate Field School /Extension (CFS /E) will provide the supplementary, situation-specific messaging which is more socially embedded, complementing the more technical, predefined dissemination system currently operating essentially through and to the government. Being equipped with Portable Intellectual Devices[12] which can link to the Uzhydromet's Message Communication Center (MCC) and provided with communication link via practically all available channels of communication (including radio, mobile, satellite, telegraph),

[12]The Portable Intellectual Device (PID) had been designed by the INCOM Companies Group (Russia) to meet wide spectrum of the hydrometeorological data exchange requirements and needs. It facilitates communication with hydrometeorological data exchange facilities used region-wide, such as the Message Communication Centers (MCC). MCC operates both regionally and locally to ensures the provision of hydrometeorological and climate data acquisition, control and transmission in coordination with all regional and national hydrometeorological services.

this will be a powerful and widely disseminated source of timely weather information and interpretation, to communities who have also undergone capacity building on the principles and uses of the system.

58. As mentioned above, climate change scenarios for Uzbekistan report not only strong aridification trend with prolonged drought cycles but an increase in location specific variability. This will require strong farmers' extension service that has capacity to interpret climate data and guide the farmers and pastoralists on short term and long term decisions. Agriculture in climate-sensitive zones is an economic challenge for subsistence and small-scale farmers. Often with limited resources, these farmers are barely able to absorb losses from failed crops due to drought, excessive rain, cyclones, pest infestation, etc. When these hazards come in succession farming household economies collapse. Long-lead climate information, although having application potential in planning and making decisions ahead of a season, is not used because of inherent uncertainties and users' lack of capacity in using them.

59. Science-based extension service is one of the critical capacity deficiencies for adaptation in Uzbekistan. The project will address this with close collaboration between the Uzhydromet, research institutes, Ministry of Agriculture and Water Resources, Water User and Farmers Associations. Development of extension service with credibility among end users, affordable and with viable institutional set up is a challenging endeavor in Uzbekistan.

60. The establishment of well functioning extension service may need to have vertically and horizontally spread structure and be fully integrated into the existing service organizations. For example, Farmers and Water User Associations can accommodate important extension services. At the same time, local Mahalla (community) level outreach and advisories can allow for local feedback mechanisms from the users. Several such localized mechanisms are possible, as demonstrated in other parts of Asia. This includes the extension office-facilitated Climate Field School / Extension (CFS /E) for farmersthat can even be mobile to cover groups of villages and acquire feedback for better tailored climate risk and response information. This is a mechanism for enhancing farmers' understanding of forecast products; improving early warning responses, which currently, for Uzbek farmers, is at 20-25% (due to slim, almost non-existent and ad hoc extension service); and education/ building awareness about good agricultural practices.

61. Many of the pilot initiatives in the region have been undertaken in isolation and did not put sufficient efforts to advocate and institutionalise such pilot practices. For example, until now the government has not received any support to establish well-functioning extension institutions which can serve as technical advisories for and promote climate resilient farm and pasture management measures. Only very recently a donor has initiated a fee-based, commercial extension service specifically for large scale, state farms as part of its loan programme in the sector. However, these services will be unaffordable and often inaccessible for small scale isolated farmers and pastoralists who reside in remote areas of Karakalpakistan. This project therefore offers customised approach to the extensions by embedding them under the community service provider institutions such as associations and mahallas. Mobile extension schools will address the issue of accessibility and will build on experience from Asian countries on mobile extension support.

62. In Uzbekistan, in arid and water stressed downstream areas there is a prevailing perception of farmers that the more water the better. There is a constant fear of water shortage because of drought and / or overuse by upstream farmers and settlements, so the farmers tend to apply water - when available - to their plots excessively, which often results in salinisation, including the secondary salinisation of soil. Without in-situ, on-farm demonstration how productive use of water

can lead to increases in farm productivity farmers will continue irrational use of water. The farmers require systematic extension service for such evidence-based advisory and guidance.

63. Interactive CFS training modules will be developed on methods of observing and recording climate data, use of historical data to assess impacts of climate variability on agriculture, climate forecast products and their uncertainties, and cropping strategies in response to climate scenarios and potential impacts. The training programme will also be designed to cover the following:

- Training of agriculture extension specialists at district level to interpret and translate climate information into potential impacts and prepare response options, train trainers at sub-district level, and assist in refining CFS modules;
- Training of agriculture extension workers at sub-district level to communicate climate information in farmers' language (not in complex scientific language);
- Training of farmers on adaptive farming practices, and adoption of the new technology (i.e. application of long-lead climate information in farming decisions).

64. In close collaboration with Uzhydromet, Ministry of Agriculture and Water Resources, associated research institutions and Universities customised approaches will be taken to select offices of service associations such as Farmer and Water User Associations, regional departments of the Ministry of Agriculture and Water Resources, regional departments of Uzhydromet etc. The selection will be a function of the existing capacities of these bodies, and will take into account factors such as: (i) the number of permanent staff (ii) availability of in-house technical skills which could be further developed for the provision of extension service with an adaptation emphasis; (iii) their locations in order to ensure maximum coverage and accessibility. These science-based extension services will be decentralized and will be disseminated through existing networks and mechanisms of Uzhydromet and offices of Farmers Association, Water Users Association and Ministry of Agriculture and Water Resources with permanent staff in all districts. This will result in better communication between land/water users and service delivery in the area of adaptive agronomic practice. Through the project this linkage will be strengthened both institutionally as well as technically. This will be in the form of: (i) facilitating a thorough review of climate adaptive crops and practices suited to the current and prospective conditions in the target area (ii) supporting dissemination and (iii) improving the underlying hydro-meteorological infrastructure together with promoting an integrated communications platform, which will make the forecasts communicated more accurate and, in particular, more timely.

65. This will be done by close cooperation between the Uzhydromet; Ministry of Agriculture and Water Resources, Basin Water Management Body (BWO) and scientific and research institutes, such as Urgench University in Khorezm, Khorezm Rural Advisory Support Service, Scientific Research Institute of Arable Farming (Chimbay) and district municipalities.

66. In summary, the Outputs and associated activities under **Component 1** comprise:

Output 1.1: Upgraded observation and monitoring infrastructure (2 Doppler water meters, automatization of 8 met stations) for effective data reception and transmission transferred to Hydromet staff with a clear protocol of maintenance requirements;

Activity 1.1.1 Conduct site identification field reviews considering the presence of existing observation infrastructure and its density, topography, population size, land use and social vulnerability;

Activity 1.1.2 Specification and purchase of 8 Automated Meteorological Stations (AMS) and 2 water gauges with Doppler meters (WG)

Activity 1.1.3 Installation, operational training and maintenance of AMS and WG at sites identified

Activity 1.1.4 Design the data acquisition, control and dissemination system (DACDS) to provide continuous data exchange between the newly installed equipment and existing systems

Activity 1.1.5 Installation and training on the DACDS

Output 1.2: Multi-modal platform for integration of data flow from hydro-meteorological observation to end users

Activity 1.2.1 Consultations with project host institution and representatives of target communities to define user climate information needs, define the most suitable format and modalities of dissemination of the information

Activity 1.2.2 Based on consultations, design data integration platform, specify and purchase of related equipment, including the operation and maintenance cost, institutional set up, procedures and budgetary allocations to secure a continuous functioning;

Activity 1.2.3 Installation of multi-modal system for integration of data flow from hydro-meteorological observation to end users including decision makers,training and maintenance arrangements secured by fully embedding the system in Hydromet departments institutional mandate and work plans.

Output 1.3: Drought early warning mechanisms (indicators, gauges, warning distribution mechanismsetc) to minimize impacts of drought in place and functioning

Activity 1.3.1 Stakeholder consultations (through workshops) to define needs of multiple users (land users, line ministries) onvaried information requirements, including delivery mechanisms, timing and frequency

Activity 1.3.2 Based on stakeholder consultation and technical considerations, finalise the agreements with Hydroment, local authorities and other key stakeholders about the locations, equipment and dissemination outlets for drought early warning

Activity 1.3.3 Installation and operationalization of drought early warning system

Output 1.4 Science-based extension services for subsistence dekhan farmers established to assist in farm-based climate risk management, including sub-district, community level Climate Field School / Extension (CFS /E) for direct outreach to farmers and localized training in adaptation practices

Activity 1.4.1 Stakeholder consultations regarding institutional options and institutional status of Climate Field School / Extension (CFS/E) mechanism to be created, priority needs and delivery options

Activity 1.4.2 Establishment of CFS/E through use of national experts. This will comprise a head office and 15 local (district) subsidiaries. These will be based on the institutions such as Water User Associations, Farmers Associations, Basin Water Management offices, Mahallas, depending on

local capacities and conditions.

Activity 1.4.3 Preparation of the extension service package, a comprehensive content and dissemination mechanisms of CFS/E materials reflecting user needs

Component 2: Climate resilient farming practices established on subsistence dekhkan farms of Karakalpakstan.

67. Karakalpakstan occupies 37% of the total territory of Uzbekistan, and has approximately 5.5% of the total population, but its GDP is only 2.4% of that of Uzbekistan. 70% of the land in Karakalpakstan is irrigated. 54% of irrigated land in the region is categorized as 'poor land'. This means that the productivity of the soil is low and the percentage of the poor soil is the highest in Uzbekistan. The main economic activity of Karakalpakstan is agriculture, which accounts for 24.4% of the Gross Regional Product (GRP) of Karakalpakstan. The major part of the workforce (33%) is employed in the agriculture. The volume of the gross agricultural output amounts to about $251,000,000. As of 1 January 2011, the area of agricultural lands in the republic amounted to 262,900 ha. The main subsectors of the agriculture of Karakalpakstan are grain production (wheat and paddy rice), cotton growing, livestock and silkworm farming. Karakalpakstan's land is especially favorable for growing rice, which is of great importance to the traditional diet. The majority of Karakalpakstan is pastureland. Pastures are the primary food source for sheep.

68. Moreover, the northern-west part of the region experiences low water availability. The ground water level and the concentration of salts in the groundwater are high, causing salinity problems in the region. The region is particularly drought prone. It was estimated that the drought of 2000-2001 left 79,000 farm households (the unemployed) in Karakalpakstan.Malnutrition became widespread in the worst-affected locales. In Karakalpakstan, the share of rural population requiring assistance doubled to 20% in 2000. By the following year the absolute number need of food aid in Karakalpakstanhad reached 600,000. The situation is particularly acute in the north of the region, which is largely inhabited by ethnic Karakalpak: a population which was traditionally nomadic pastoralists and who only settled in the early part of the 20th century. People in local communities rely in most cases on their small household plots plus a few head of livestock and, in some cases, remittances sent by relatives working abroad. After large scale collective and state farms (Kolkhoz and Sovkhoz) were dissolved after independence, they have been transformed into agricultural production cooperatives – shirkats. At the same time, small number of private farmers began to emerge by leasing land from shirkats. As a result of agricultural reforms that started in 2003, many unproductive shirkats have been abolished and large scale farms emerged. This was part of the so called 'land optimization policy". The policy promotes integration of a large number of weak farmers into relatively limited number of large-scale farms.

69. As of 2011 there were 4119 official, commercial scale farms, of which 3523 are crop farms, 435 livestock farms and 152 are specialized in other activities. The lands leased by them from the government are 585.6 thousand ha. The GDP of the agriculture sector in 2010 was almost evenly divided between crop and livestock production.

70. However, in addition to these larger and officially recognized farm operations, the household plots' system which was already introduced in Soviet era still remained functional. These small family plots are called Dekhkan farms. Every household received official rights of a lifelong tenure of a plot (tamarka) and can consist of sub-plots of irrigated farm land, non-irrigated farm land and pasture land. This is clearly a powerful incentive to invest in spite of the limitations of owning only a small plot.There are approximately 230,000 dekhkans in Karakalpakstan and the family members of these households represent about 95% of all households in Karakalpakstan. As

such, any improvement in the productivity of Dekhkan farms and any activities which increase the adaptive capacity of the households will have significant welfare benefits. Therefore, the project focuses on dehkhan farms, but also includes commercial farms, as they are also a critical part of the economic landscape. For example, a majority of land officially allocated to livestock production is leased by commercial farms, yet the vast majority of animals are raised by dehkhan farmers (who typically engage in a mix of cropping, livestock raising and other income generating activities, depending in part on the rainfall zone). These livestock are mainly allowed to graze on state land, which in practice is considered to be common property, leading to overgrazing. Hence a landscape-wide approach is required, involving all the key groups, providing support as a function of degree of vulnerability. A participatory approach is required to land use planning and management, which will be explained in more detail under Component 3.

71. There is a general agreement that there has been significant growth in agricultural production since 1996. The interesting point to note is that this growth can be attributed largely to Dekhkan farms and households who, despite occupying only 11% of cultivatable land, account for 60% of production.Dehkan enterprises dominate Uzbekistan's livestock sector in particular, producing up to 90% of the total output. Clearly these farms are relatively productive, as they are free from pressures of state orders and enjoy greater flexibility in farm-based decisions and can adapt autonomously. However, the sector is highly fragmented, and its development is hampered by underinvestment, poor farming, water and land management practices and deteriorating infrastructure in spite of the potential cost effectiveness of investments given the relatively high efficiency of these farms.

72. The project will target approximately 40,000 Dekhan farmers in Karakalpakstan covering approximately 80,000ha of farm and pasture land under the adaptation measures13.However, limited number of larger farms will also be targeted because, first-of-all, many dekhkan farmers also work on larger farms which they lease and, secondly, larger farms and farmers are potentially important agents of agricultural transformation in Uzbekistan. If the economic benefits of increased productivity through proposed climate resilient conservation agriculture practices will be demonstrated on their plots, the scale of replication and upscale will considerably increase as a result of this project. Finally, almost all pasturelands are owned or controlled by large farmers, and pasture land is anticipated to become an important adaptive resource under a scenario of gradual aridification.

73. Nevertheless the primary target group of the project is the dekhkan small scale farmers, given that they are the most directly vulnerable to climatic shockssuch as drought as well as having few good options in the face of longer term aridification. Specifically, the project will introduce and promote the use of options such as moisture conservation practices in-field (Output 2.1, including for fodder production), water saving irrigation practices in-field (Output 2.2) and affordable greenhouse production using nationally manufactured drip irrigation (Output 2.3). Finally, the upscaling potential and sustainability of these capacity building and small scale infrastructural investments will be facilitated through the promotion of a legal and regulatory framework which supports agronomic practices which will have been proven over the seven year life of the project to be cost effective and beneficial in terms of direct and indirect adaptation effects (Output 2.4).The project will promote carefully selected agronomic, soil and water conservation measures constitute conservation agriculture (Output 2.1) and these same principles also have strong adaptation benefits

[13]Based on the official data indicated in the Statistics Bulletin on dekhan farmers as of the 1 January 2011, there are 232,246 of dekhan farmers (of which 1,199 as legal entities) on47,095 hectares of land in Uzbekistan. In Karakalpakstan, (The Ministry of Economy of Karakalpakstan) there are 45,369 dekhan farms covering 228,928 hectares of lands as of 2011.

under a scenario of reduced average rainfall but likely more intensive and therefore erosive rain events:

- Disturb soil as little as possible (reduce tillage to the bare minimum, at the very least only rip planting lines and make holes for planting seeds, when necessary);
- Retain crop residue on the soil surface (important to reduce evapotranspiration rates, reduce soil erosion and retain soil moisture)
- Rotate and diversify crops (betting on only one crop increases the risk of total failure in the event of drought, whereas growing diverse crops promotes increased income stability)

74. It is expected that as a result of the above mentioned and other conservation agriculture adaptation measures will improve water and land productivity by at least 15-20%.

75. Much of the farmland of Karakalpakstan is under irrigation and hence the improvements in water saving and efficiency techniques are necessary to cope with current and anticipated shortages. Given that the groundwater table is high in many areas, exacerbated by poor irrigation practice, water starts to be drawn up to the soil surface by capillary forces. Here it evaporates, leaving behind the salts. This is the feared secondary salinization of irrigated agricultural soils which greatly affects crop productivity and farm income. With climate change, increased evaporation and evapotranspiration rates will inevitably increase this salinization process and require greater amounts of water to leach out the salts. Therefore, the activities to be financed under Component 2 measures for addressing soil salinisationwill be applied through measured watering, discharge control, drainage control measures at the farm level, and raising farmers' awareness about the impacts of over irrigation. In fact, more water efficient and adaptive irrigation scheduling methods will be designed, based on localized climate models and seasonal forecasts from Component 1.

76. Water efficient and water saving irrigation technologies will be introduced. Based on initial calculations, the cost of various water efficient irrigation technologies such as drip and siphon irrigation per $100m^2$ range between $500-2000. Very localized approaches to the selection and diffusion of the irrigation technologies will be applied, considering the cost, local topographic, soil structure, crops and cropping patterns and other important variables. All of these interventions can be summarized as adoption of water saving irrigation practices, which is output 2.2.

77. The project will work with Dekhan farmers to introduce climate resilient farming, land and water management practices. As such, through the project farmers will rely less on the current maladaptive practice of massive application of water to compensate for poor land leveling, accumulation of salt and poor drainage; but rather will be placing a greater emphasis upon water conservation. These will include deep ripping followed by minimum tillage, which would help mitigate the current problem of plow pans (compaction, which inhibits both water and roots), which results from ploughing land which has not been sufficiently drained. Furrow irrigation techniques will also improve farm-based drainage. There are numerous techniques of conservation agriculture (output 2.1) together with water efficient irrigation which will be applied as tested and demonstrated to be successful in the conditions of target region. This will be done in close partnership with the University of Urgench, which has considerable amount of work and expertise to offer. The results of these efforts will be documented as good practice (Output 2.4) to secure necessary knowledge for upscaling.

78. The project will also apply irrigation technology in the context of greenhouses for horticultural production as a climate risk management strategy by reducing the impact of droughts

(Output 2.3). It will help establish horticulture greenhouses as both individual and cooperative endeavors and will promote women to lead related initiatives, through women's groups. The objective of a greenhouse is to protect plants from the excessive solar radiation and temperature, and to prevent excessive water loss by plants. This is consonant with the needs of the target area, especially since water resources are very limited, there is high rate of solar insolation and high temperatures and all are expected to increase. However the primary value of the greenhouses will be to extend the production season (several early crops in spring); therefore less sophisticated greenhouse could be satisfactory and the approach cost-effective. The high initial investment in a drip irrigation system ($2,000-3,000) and the greenhouse ($3000-4000 per 100 m^2) and a lack of knowledge and practice are the main barriers to the development of these industries on a market basis among more vulnerable populations, which would otherwise be an ideal means to diversify and improve incomes. Only a few, larger farms located upstream in Karakalpakstan can currently afford greenhouses of the types readily available.

79. Clearly horticulture greenhouses, in spite of the startup costs, would significantly help reduce exposure and vulnerability to drought and related water stress and stabilize the farm income. Therefore, this project aims at capacity building of dekhkans, farmers and the most vulnerable people with applying practical examples of the establishment and use of greenhouses and drip irrigation methods, including calculations of socio-economic benefits. Such numbers, currently rare in the region, will help create a foundation for evidence based prioritization both by the government and by future projects. Financial incentives will be required to stimulate broader adoption of greenhouses through Dekhkan cooperative arrangements or individually. Makhalla funds accumulate substantial resources internally which are disbursed on the basis ofcommunity needs, mainly on infrastructure rehabilitation. These funds could be turned into a powerful adaptation financing mechanism at local scale, if directed towards climate resilient agricultural practices that minimize exposure and impacts of drought and long term aridification. Fund requests are arranged through Dekhkan cooperatives; requests can be supported by the project for activities which contribute to effective drought management measures based on evidence, a review of which will also be supported by the project. The corresponding vital local political institution is Makhalla or village citizen council, through which institutionalization of successful arrangements will be sought with a view to sustainability. There are about 12,000 Makhallas in this region and the institution has a direct outreach to the local communities who can play important role in moving the Dekhkan farming and pastoral practices towards adaptation options.

80. In addition to crop production, the project also will help address the need to rehabilitate degraded pastures (rehabilitation of vegetative cover); promote improvements in pasture irrigation would bolster the livestock sector against the drought; increase fodder availability to reduce the use of autumn and winter pastures; invest in repair and maintenance of key pasture use infrastructure (e.g., wells) to allow for greater flock mobility; set-asides and sowing of pastures with more productive species. More specifically, the project will undertake a number of activities on pastureland.

81. Over the last decades overgrazing and insufficient grazing has led to the degradation of grass on the pastures of Karakalpakstan. Currently, in the target area "free grazing" practice is in use, where the livestock released to any part of pastures with little monitoring of the effects on the rangeland. As a result, livestock often eat only part of the grass, and the rest is trampled. Under "free grazing" livestock do not usually eat plants with small or only few blades, and, thus, reduce the quality of forage plants throughout the grazing area in a short time. Achieving equitable grazing of pasturage by livestock is a management challenge. In countries with developed livestock systems where there is enough grass and water, livestock is fenced in specifically for this purpose. During this period, the remaining sections of pastures are not used. However, this is effective only when it

is implemented on improved pastures and with the existence of permanent sources of watering crops and high grass. Through investments in rangeland water infrastructure such as rehabilitation of correctly sited wells, the project will help establish satisfy these conditions.

82. Improvement of pastures in arid zones is a complex and difficult task, given the harsh environmental conditions. Effectively improvement of the desert pastures, as shown by recent studies, is best achieved through using the same kinds of plants that grow in natural desert phytocenosis. In this context, to improve the pasture of the target zones the project will use such plants as Saksaul and Tamarix (see Component 3). This landscape scale intervention will provide a forage base in drought years for agro-pastoralists.

83. In terms of the project replication and the strategic value of Component 2, as many Dekhkan farmers also work on leased larger farms. In the wake of on-going agricultural reform and farm consolidation processes these farmers are increasingly becoming the agents of agricultural modernization and can equally become agents for transforming farming and pastoral practices towards more climate resilience by adopting new technologies and methods. As such, selectively targeting this particular farming group (some 20% out of total target group) has strategic importance in terms of replication and upscaling. These farmers can afford to releasea portion of their larger farm plots for experimentation to demonstrate increased productivity as a result of adaptation measures.Close monitoring and accounting of water and land productivity will be conducted. In addition, as mentioned, a legal and regulatory framework will be promoted by the project in close collaboration with the government at different (especially Khokimiyat) levels to support well tested farm-based adaptation measures for replication and upscale. This will ultimately lead to a resolution by the Ministers Council of Karakalpakstan that provides appointment of responsible agencies for replication and upscaling both during and after the project.

84. In summary, the Outputs and associated activities under **Component 2** comprise the following:

Output 2.1 40,000 subsistence Dekhkan farmers have adopted climate resilient conservation agricultural practices on 80,000 ha of farms

Activity 1.2.1 at least 4 consultation workshops with the farmers, pastoralists and research institutes to determine the most suitable mix of crops and practices (such as low till, mixed cropping, fodder production and crop residue application) of drought resilience options in the selected sites

Activity 1.2.2 at least 8 Farm-based demonstrations of conservation agriculture and productive grazing arrangement organized with technical guidance provided by the national experts (5 experts for 3 months each) from the research institutes and direct engagement of targeted farmers and pastoralists

Activity 1.2.3 Preparation and dissemination of conservation agriculture guide for long term climate resilient agro-pastoral systems in the context of Karakalpakstan

Output 2.2: 40,000 Dekhkan farmers have adopted improved irrigation and drainage practices on 80,000 hectares to improve farm-level drainage and reduce salinisation

Activity 2.2.1 at least 4 participatory surveys conducted with farmers, local authorities, research institutes and associations to determine and agree on the right mix of irrigation and drainage technologies and methods in the target locations

Activity 2.2.2 Filed-based demonstration of improved irrigation and drainage practices / technologies (e.g. land leveling, water efficient irrigation infrastructure etc) with a direct guidance from the national experts (3 experts at 2.5 months each)

Activity 2.2.3 Field-based demonstration of pasture-land well rehabilitation and management for improved water supply for pastures and livestock, ensuring greater mobility and maintenance of vegetation;

Activity 2.2.4 Preparation, publication and dissemination of technical support material on improved irrigation and drainage based on lessons learned from the project

Output 2.3: 40% of targeted Dekhan farmers have established horticulture greenhouses on 20,000 ha of farms to minimise impacts of droughts on farm production.

Activity 2.3.1 Community consultation and mobilization to introduce range of horticultural greenhouse options that are affordable and help in drought preparedness

Activity 2.3.2 Technical design (engineering parameters, siting, construction, operation) and business plan developed to ensure effectiveness and efficiency of the greenhouse in the context of Karakalpastan for a long term sustainability and high replication potential;

Activity 2.3.3 Preparation of publication of good practices in greenhouse operation, (focusing on the issues of low cost, low input, low energy and high output options; creating the micro climate for crop protection and mitigation of adverse impacts of drought)customized to the needs of Dehkhan farmers and the condition in Karakalpakstan

Output 2.4: Legal and regulatory framework developed and adopted to secure the replication and upscale of well tested farm-based adaptation measures

Activity 2.4.1 Policyand legislative review to identify the critical gaps in promoting the climate compatible adaptation practices in agriculture

Activity 2.4.2 Desk study to review the best international legal and regulatory practice that promotes farm-based approaches to drought management and incentivizes conservation agriculture and water efficient irrigation systems

Activity 2.4.3 At least 8 stakeholder consultations conducted by the national and international experts to prepare a mix of normative acts and regulatory instruments that can be adopted in the legislative context of Uzbekistan for an effective integration of identified adaptation priorities in agriculture (specifically in the context of Karakalpakstan)

Activity 2.4.4 Preparation and adoption of a set of legal acts and regulations to incentivize conservation agriculture and climate resilient agricultural practices and technologies in Uzbekistan and implementation of procedures leading towards the enactment

Component 3: Landscape level adaptation measures for soil conservation and moisture retention improves climate resilience of 1,042,094 ha of land

85. The long term effectiveness of the interventions at farm scale through Component 2 are contingent in part on addressing underlying issues of ecosystem function – and anticipated changes in those functions due to the effects of climate change – at the contextual scale, that of the

landscape. The individual farms upon which conservation agriculture and improved irrigated practices will be implemented exist within a patchwork of environmental units, which interact with each other in a variety of ways which are not always readily discernible. In particular if land degradation (biological, chemical, physical) takes place slowly, the connections may only be seen once it is too late (for example a level of salinization or alkalinization which is too high to economically restore). Therefore the scale of the planning context for the project has to be sufficiently large to be commensurate with the landscape wide changes taking place in terms of mobilization of sand particles, soil erosion more generally due to natural causes (reduced vegetation cover due to reduced rainfall) and anthropogenic (ie reduced vegetation due to overgrazing). It must also be of sufficient scale in temporal terms, and with a 7 year timeframe this project has a more realistic horizon.

86. The breakdown of Soviet-era pasture management systems and the fodder supply chain has resulted in a reduction in the mobility of grazing, which is a vital component of sustainable pasture use in such arid environments. Imbalances in pasture loads are occurring with under-utilization of some areas, and severe local over-grazing of others. There is an increasingly sharp imbalance between the availability of summer and winter feed, resulting in severe overgrazing of some winter pastures. However, since independence Uzbekistan has made a sustained effort to reform its agriculture and land use sectors, based on a gradual process of transition from the Soviet model towards a free market based one. Additionally, the government, with donor support, has pursued various pilot efforts to test new approaches to land management. There is clearly in recent years an increasing government awareness of the economic, food security and environmental significance of land use in non-irrigated areas, and a commitment to addressing them.

87. Major challenges remain in both pasture use and the forestry sector over land tenure and user rights. This is a particularly stark issue in the pasture use context, as at this point in time, households are not recognized as land users and thus have no official pasture use rights, despite the fact that in many areas household livestock out-numbers those on official farms. Pasture land belonging to semi-state farms near settlements is by necessity utilized by communities but without any official tenure, regulation or systematic management. As the population of these settlements and their livestock continue to grow this is leading to increasing pasture degradation.Currently, land use is seen in a highly 'rational' or categorized manner (arable land is just for crops, rangeland just for livestock production, etc). A broader approach will be introduced through the project, for multiple benefits, and reflecting the integrated planning required for adaptation.

88. In general there has been a pattern of underinvestment in landscape scale rehabilitation by the government and the donor community in Uzbekistan because of the attention given to agricultural reform on irrigated farmlands. While this project does help address the adaptive needs of irrigated farmlands, it also recognizes as imperative the need to facilitate the development of integrated management scheme in the broader context of the productive landscape. With the view of long term adaptation to projected climate aridification and prolonged meteorological drought, landscape level adaptation becomes critical. According to the UNEP aridity index[14], most of Uzbekistan's territory, except for the foothills and mountains, is classified as a drought zone and is therefore very susceptible to land degradation and desertification. Therefore, a landscape level integrated planning for land use and landscape rehabilitation is a necessary, region-wide measure to improve drought management and long term adaptation to greater arid conditions. This must start from a vision at an appropriate scale as well as being based on an understanding of the drivers which are affecting water supply, sand storms, salinization at the perimeter of farms in addition to on-farm salinization, loss of grazing and fodder etc. For the plan to work it must of course also have

[14] The UNEP aridity index is based on the ratio of rainfall to potential evapotranspiration(Middleton & Thomas, 1992, 1997).

the buy-in of both the direct and indirect land managers, and their participation start from the beginning. Finally it must have some incentives to ensure participation and sustainability. This component is devised to incorporate all these factors, starting from a comprehensive review also benefiting from international experience as well as the best local scientific knowledge, and ending with community ownership and management of benefits from the ecosystem services being restored through improved functional integrity at landscape scale.

89. The project will therefore engage all the relevant stakeholders through a series of consultations to devise a landscape rehabilitation and management plan which will encompass different types of land ownership; farmers land and state land, and the current and prospective range of land uses. More specifically, a climate scenario based land rehabilitation plan will be developed with the full engagement of Uzhydromet and the national and (through consultancies) the international scientific community and the government at all levels, including consideration of international experience in similar cases. This process will also serve as a capacity building opportunity in terms of land use planning, scenario building, participatory planning, the results of which will be incorporated into a Geographical Information System (GIS) for decision support. The scenarios will be interfaced with the climate modeling expertise of Uzhydromet and will also build up the hydro-meteorological network and data integration infrastructure being upgraded through Component 1. In fact, the same network will be used together with complementary measures to help monitor the effectiveness of the landscape scale interventions (mainly plantations which have multiple benefits). Multiple forms of information will be incorporated and represented in an interactive way back to direct land users and land managers (government) to develop several possible land use plans under several possible scenarios. These plans will then be compared in terms of optimum location in terms of ecosystem function but also cost effectiveness for the main proposed interventions.

90. It is important to recognize as part of this planning process that with climate change induced aridification one can expect changes in the intensity, direction and speed of the wind, sand mobilization will almost certainly increase, with significant effects on the productivity of farm lands in the area, in particular through the activation of salt migration processes. Winds as low as 6-10m/sec can promote sand and dust storms and in flat regions there are between 10 and 30 dust storm days per year. When wind strength reaches 15m/sec or more, sheep stop grazing and these conditions are experienced about 11 days per year. The arid lands of Karakalpakstan are particularly susceptible to wind erosion and dust storms often destroy vast areas of farm and pasture lands.

91. The main reasons for earlier failed attempts to encourage large scale rehabilitation of vegetation cover and the maintenance of plantations relate to the *adhoc* nature of such efforts which were not linked with a broader view of landscape functions, were poorly planned in terms of geographic location and coverage, and did not have a perceived benefit on farm and pasture lands in their functions as windbreaks or sand stabilization. These plantations, furthermore, had not taken into account climate change scenarios; for example incorporating wind models which show the dynamic of change of the hysteresis line, which in turn indicates where the plantations need to be located if they are to have adaptive value.An increase of wind power over vegetated dunes will not cause the total extinction of vegetation. The microphytes, annuals, shrubs, bushes or trees will form an effective buffer between the wind and the sand. The connections of these points of stability are known as lines of hysteresis. Sand dunes with any amount of vegetation are stable in their state when they are on these lines. Any natural change in the wind power or artificial change in vegetation cover will bring the dune to a new position on the hysteresis line, and the anticipated lines of hysteresis need to be computed taking into account projected changes in wind pattern due to climate change.

92. More specifically, the project will initiate the implementation of this more strategic approach through a long term plan by commencing the plantation oflocal arid plants of saksaul and tamarix to deliver sand stabilisation and soil desalinisation functions on a targeted 70,000 ha. However, the impacts of these efforts will be felt on over 1 million ha as the functions of soil structure improvement, stabilised sand mobility and moisture content in soil will be spread at broader targeted landscape (Output 3.1). The area to be covered will be through two agents; farmers and pastoralists on their land and the government on state land. These plantations will also serve as windbreak buffers both on the large farms and farm and dekhkan adjacent areas, hence directly and visibly benefiting farmers, which will help overcome a barrier to some earlier failed attempts at large scale sand stabilization plantations in Uzbekistan and elsewhere. The plantations will also provide fodder for livestock, which again will be a significant benefit. These species have been shown through projects to be ideal for these three purposes and under these conditions. It is critical that these efforts have been made in the areas that will protect the farms and pastures from being buried under the desert sands as well as protect these productive lands from wind erosion.

93. In arid and semi-arid zones, density of plantations depends on the richness of the soil and the depth of residual moisture, but particularly on rainfall. The lower the rainfall, the greater the spacing along and between planting lines, in order to avoid competition between seedlings and exhaustion of the soil's water reserves. However, the density selected must allow the slowing and suppression of wind erosion. With the growing concerns of further aridification intensive droughts and greater seasonal temperature anomalies, wind speeds, frequency and directions will also be impacted by climate change. The project will cover the additional cost of sand fixation and rehabilitation efforts that are underpinned by localized climate and wind models. The adaptation benefits of sand fixation and windbreaks will be enormous as these will prevent sands from advancing and perpetuating wind erosion and desertification processes. These plantations as a result will considerably increase land productivity of adjacent farm and pasture lands which provides sustainable development of livestock and diary production by most vulnerable communities in drought years.

94. With this approach, and based on model generated scenarios of wind direction and speed alterations, the farming and pastoral community will see the direct benefit of their lands being protected and landscape functions and integrity improved to maintain land productivity (moisture retention, less susceptibility to wind erosion etc). This approach will forge the direct participation ofsome 75,000 farmers in planting and/or maintenance of the plantations (Output 3.2.) Through the khokimiyat (district municipalities, i.e. local authorities) and makhalla (self-government at the community level) institutions community employment programmes will be used to engage local population in land rehabilitation and sand stabilisation works. This represents a significant labour market opportunity in the project area and will also be a way of capacity building the target population in terms of the technical skills required to plant and later maintain the plantations, which will help ensure sustainability of this investment. While there have been efforts directed at landscape level sand stabilization in the region, the shortcomings which emerge from earlier lessons and which will be taken into account in this project are that sand stabilizing plantations have been established in the remote areas without clear maintenance and ownership model. As a result, in light of the need for fuel wood, there has been destruction of large segments of the plantations as a form of perceived open access resources.

95. Even more importantly in terms of sustainability, as an incentive as well as to maximize capacity building, communal ownership and maintenance responsibilities will be arranged through khokimiyat and makhalla structures (output 3.3).and introduced. Ultimately the communities who manage the plantations (especially in the peri-farm areas and within community jurisdiction) will

benefit from their efforts, directly in terms of employment income, fodder and most importantly, in terms ofincreasing land productivitythrough the landscape rehabilitation efforts.

96. In summary, the Outputs and associated activities for **Component 3** comprise:

Output 3.1 Landscape level adaptation measures for soil conservation and moisture retention improves climate resilience of 1,042,094ha of land.

Activity 3.1.1 Wind model outputs generated to develop a short and long term replantation and landscape rehabilitation plan; monitor sand stabilization and soil desalinization as a result of project activities, based on wind models, as well as to provide an empirical basis for the landscape scale integrated rehabilitation plan

Activity 3.1.2 Establish an expert team to develop a comprehensive plan on sand stabilization and landscape rehabilitation for improved land productivity and resilience of adjacent farm and pasturelands

Activity 3.1.3 Participatory process with local land users, representatives of land management institutions and technical parties to facilitate inputs into full landscape rehabilitation plan incorporating both on and off farm areas

Activity 3.1.4 Community mobilization and involvement of technical team to organize and implement on-the-ground work on replantation of sand stabilizing plants and windbreaks

Activity 3.1.5 Preparation and dissemination of publications on good practice in sand stabilization based in part on project experience

Output 3.2 Community Management Scheme (plantation establishment and maintenance) as a community employment scheme for landscape scale adaptation

Activity 3.2.1 Undertake stakeholder consultations, including through workshops, to assess community participation and labour allocations per task and travel logistics

Activity 3.2.2 Hiring of national experts to provide technical assistance in development of a community management scheme and management arrangement

Activity3.2.3.Organization of a mobile community and expert monitoring team with respect to maintenance work on the plantations and documenting the impacts

Activity 3.2.4 Publication of good practice material on community management of plantations for adaptive objectives in dry environments

Output 3.3 Cooperative management arrangements for landscape scale rehabilitationand management established to enhance community control and ownership arrangements

Activity 3.3.1 International good practice in community cooperative resource management reviewed and applied in the project context and identify management options

Activity 3.3.2 Establish farm-based and community cooperative management system for maintenance of the plantations through the local Mahallas (community organizations)

Activity 3.3.3 Hold stakeholder consultations, including workshops, with target communities, to identify options and best model for community management system

Activity 3.3.5 Preparation and publishing of good practice material on the establishment of community co-management systems

Component 4: Knowledge of climate resilient agricultural and pastoral production systems in arid lands generated and widely available

97. The number of agronomic research and projects in the sector of agriculture in Uzbekistan is impressive. However, there is little collated information that can facilitate broader sharing and uptake of certain well tested practices. There are no well-established mechanisms to codify knowledge from the wealth of existing experience accumulated through national and international projects and turn into well synthesised advisory or advocacy products which could be used to influence policies as well as farmers' practices. Even if such knowledge exists sporadically on the CARnet for Central Asia or at the University of Urgench it is not systematically communicated or analysed in the light of climate change risks.

98. Furthermore, while the government and rural communities are very well aware of increasing climate variability which is negatively affecting agricultural production and people's livelihoods, there is little awareness and knowledge how to move towards climate resilient solutions. This is an underlying cause of the current situation where, despite some sporadically demonstrated water saving irrigation and agronomic methods take up rates are very low and the farmers continue the same inefficient and unsustainable practices that increase their vulnerability to drought and climate change risks.

99. To help address this barrier, and in order to help ensure cost effectiveness and the sustainability of the activities put in place by the project under the first three components, the project will also operate an applied knowledge management exercise in parallel to the rest of the project, initially focussing on an inventory of known successful practices having adaptive value (Output 4.1), based on both domestic and international sources. The project will then continue to monitor and evaluate throughout the course of implementation, and through this component capture, analyse and disseminate good practice from the project itself. Unfortunately, existing good practices have largely been demonstrated at the scale that makes the justification for broader application difficult. The project itself will attempt to demonstrate scalability, especially through Component 3.

100. As both a basis for planning and as a means of knowledge analysis and dissemination as it is generated through the project, Khorezm University, amongst others, will be tapped by the project, definitely represents a strong knowledge centre in agronomic and agricultural research for Uzbekistan in the context of Output 4.2, analysis and dissemination of lessons learned through printed and web based publications. To date outreach mechanisms and the transmission of this knowledge are limited in scope (within the scientific community), and are not well tailored or systematic. Moreover, any lessons learned are not being captured in a fashion that facilitates broader sharing, or that casts light on ways to address an aggravation of the food security situation during the droughts and as a result of climate change.

101. Another critical barrier to climate resilient farming relates to the absence of government policy or financial incentives for the large scale adoption of successfully tested measures with strong adaptation value. This is in large part hindered by low awareness of economic returns these adaptation measures can bring or their value in minimizing losses from drought. In anticipation of

the production of applied knowledge which could be upscaled if broader support were there, as well as with a view to sustainability, the projectwill undertake a comprehensive review of lessons (including, where possible, on the financial and economic costs and benefits of the activities over various timeframes and scales) and will partner with key knowledge organizations such as Urgench University and others in establishing a virtual and possibly physical knowledge centre for climate resilient farming and pastoral practices in the arid lands of Uzbekistan. Similar partnerships will also be built with the Bioecology Institute of the Karakalpak Branch of the Academy of Sciences and a field station near Muynak. Its main research directions are combating desertification and salinity as well as soil microbiology, biology of plants under saline and drought conditions. The project will organize regular field-based demonstration meetings for targeted advocacy and replications. Such meetings will be organized on the project demonstration farms with participation of local authorities, other farmers, national government representatives and media. Demonstrations of concrete farming and pasture management methods that provide evidence of bringing benefits of greater food security and resilience to droughts will trigger the replication.

102. Other partners include the field knowledge generating non academic institutions with which the project will have built strong links over the course of joint activities, such as water user associations, farmer associations, womens' associations, Uzhydromet subsidiaries, and various other institutions operating in the project area. It will be important to ensure feedback learning with such groups, which will be ensured through holding quarterly demonstration meetings, both on and off farm, of successful practices either identified or introduced by the project.

103. Wider dissemination and goodwill will also be achieved through media coverage (Output 4.3); press, radio and television; to this end journalists will be invited to selected demonstration meetings, in particular where results are visible. Where necessary materials will be published in various languages to ensure maximum accessibility. It may also be possible to explore linkages with schools in the area for the purpose of awareness raising and with a view to sustainability. Finally, advocacy materials will be prepared for various audiences, including government, for similar purposes.

104. In summary, the Outputs and associated activities for **Component 4** comprise:

Output 4.1 Inventory of tested agronomic and water saving measures to map out successful practices

Activity 4.1.1 International experience surveyed, synthesize proven practices of potential value to the project beneficiaries as part of adaptive strategies

Activity 4.1.2 Technical assistance provided in inventorying promising water efficient agronomic measures in the field

Activity 4.1.3 Publication of results of inventories, both initial inventory as well as updated inventory based in part on the experiences to be gained over the course of the project

Output 4.2 Analysis and lessons learned for climate resilient agricultural and pastoral production systems in arid lands documented and disseminated through printed and web based publications

Activity 4.2.1 Analysis and documentation of lessons learned for climate resilient agricultural and pastoral production systems

Activity 4.2.2 Publication and dissemination of lessons learned on climate resilient agricultural and pastoral systems relevant to drier areas of Central Asia

Output 4.3 Quarterly farm and pasture land demonstration meetings covered by the media and attended by national and local authorities delivered

Activity 4.3.1 Quarterly meetings held, covered by the media, in order to highlight successful adaptive practices for replication.

Activity 4.3.2 Preparation of media footages and advocacy materials to demonstrate field-based results of tested adaptation measures

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

105. Climate change driven aridification and more prolonged and intensified droughts will adversely impact the country's farmland. 90% of yields in Uzbekistan are derived from irrigated land. Increases in temperature will therefore inevitably result in a rise in irrigation usage and costs, aggravate water stress and result in frequent crop failures. For example, losses of grain crops reached over 20% during the drought of 2000-2001.Based on the Second National Communication (SNC), model estimates indicate that by 2050 irrigation rates may increase by 8-11% in order to compensate for reduced water availability. The total required water withdrawals in 2025 will be 59km^3 andscenarios also show that by 2030 these may in fact go as high as 62-63km^3, and by 2050 – to 65-66km^3. In short, these estimates show that while the total water deficiency in 2005 equaled only 2km^3, by 2030 it is projected to increase to up to 7km^3 and by 2050 – up to 11-13km^3. This is clearly unsustainable under business-as-usual.

106. More specifically, it will clearly have serious social and economic implications on a country which relies so heavily on the agriculture sector, both in terms of employment and GDP. The proposed adaptation strategy will deliver direct economic benefits in one region, and as the first adaptation project in the country will serve as a model, providing a leveraging of benefits and therefore cost effectiveness beyond the project area and timeframe.For example, the national Land Reclamation Fund spent $292 million during the 2008-2011 period, expenditure which benefit from little, if any, adaptation planning. This and related investments of scarce capital will be rendered more cost effective in future allocations by benefiting from findings and models developed over the course of this project.

107. The project will address the key adaptive challenge in the context of the target area - improving water use efficiency in an accessible and cost effective manner- by presenting and promoting a range of means to minimize water use per unit of agricultural/pastoral output. It will do so in part through water and soil conservation measures which (i) respect the well-established principles of conservation agriculture (ii) are not expensive and as such can be implemented even by subsistence farmers and (iii) which are known to generate multiple environmental benefits such as increased organic matter, richer soil biota and reduced runoff . Irrigation techniques(including schedule adjustments) and drainage control mechanisms which minimize water use and counteract the salinization problem, as well as cropping methods which retain moisture in the soil,will maximize output per drop even in light of more frequent drought and anticipated progressive aridification. This will mitigate the effects of climate change of farm level incomes and the social risks associated with farm abandonment, rapid urbanization and loss of agricultural knowledge.

108. At the level of lower technology and cost, the project will introduce basic principles of conservation agriculture to 40,000 dehkhan farms and, in particular, pastureland. Zero tillage (equipment and implementation) costs only $10-20 per ha, while low tillage costs$20-30 per ha.Mixed cropping costs $25-35 per ha, under a system of zero tillage. Low tillage contributes to yield increase up to 50%, as it reduces the losses of soil moisture and of soil itself when deep ploughing is undertaken. This is accessible technology which can be readily upscaled and is highly cost effective and delivers significant economic benefits. This practice as well as others will be introduced through the extension services, which will become more effective in reaching subsistence households. In addition, dehkhan farmers will have organized during this period, putting them in a better position to demand support, and as their productivity improves will also become seen as more of a driver of economic activity by the government. Hence there will be multiple benefits both during and beyond the project.

109. Moving up a notch in cost, and focussed entirely on plots for agriculture, laser leveling will be introduced to ensure that water distribution is even during basin irrigation when water is available (for farms who have access to the centralized irrigation system). This will increase water use efficiency and reduce the likelihood of salinization for project beneficiaries, as well as allowing more water to continue down the distribution system.

110. The costs of laser leveling are $320-350 per hectare depending of the land profile and mechanical composition of the soil

The **benefits** of laser leveling application are:

- Establishing a single plot with the irrigation water supply from one side only
- Increasing the land use factor up to 0.92 - 0.95% ; important on small dehkan plots
- Ensuring the uniform and rapid distribution of irrigation water along the entire surface of the plot, and reduction of water losses up to 25 - 30%;
- Increase the efficiency twice over of people applying the water
- Establishing a uniformly improved environment, resulting in the favorable conditions for plant growth, increasing yield productivity by 20-30%

111. Moving to the top of the cost spectrum, there will be multiple benefits derived from the introduction of greenhouses. As these are relatively expensive the project will also organize neighbouring dehkhan farmers to collaborate through existing social institutions as Mahalla community level. The farmers will receive significant financial benefits from the greenhouses, but more importantly will be exposed to new techniques of controlled climate horticulture, the cost of which is expected to come down as economies of scale are realized through increased demand stemming from a demonstration effect. For this reason commercial farms (which have their own resources) will also be included in this activity. The total cost of the greenhouses anticipated to be introduced through project will be approximately $18,000, which includes land preparation, the greenhouse and the drip irrigation system, as well as labour and other costs. However the project will also review options for lower cost alternatives. For example, a tunnel with a cover having an air layer as insulation - $46 per m^2; glass covered - $77 per m^2; tunnel and plastic covered - $105 per m^2. Various combinations will be tested and adapted to local circumstances. This will also provide a benefit to those dehkhan groups who contribute land to these pilots, in so far as they will have an opportunity to experiment with appropriate technology solutions. Whatever the design(s) selected, the benefits in all cases will be primarily to extend the cropping season into the spring and fall, when it would otherwise be too cold. If a drought were to come in the late spring, farmers

using greenhouses would have already grown rootstock, which would not have been established under drought conditions; this increases the chance of plant survival and mitigates the hit on household income from climate change related weather shocks anticipated on the basis of the SNC and other sources.

112. Although there is an initial barrier to entry in terms of cost of the infrastructure, the greenhouses are potentially highly replicable due to the short time to repayment of the investment, as laid out in thetable below.

Table 4. Financial calculations for greenhouse benefits and repayment timeframe

	Basis of calculation	SubTotals & Total
Cost	Establishment of greenhouse (size 520 M^2), including the labor and all other costs is $18 000. All expenses including purchase of seedlings, fuel, fertilizers, transport are $30 000 per year.	
Revenue Spring	The total early spring yield (tomatos: Bella, Elpida, Holland) is 6,750 kg The price per kg in early spring for tomato is $2.5	$2,5x6750kg = $16 875
Revenue Fall	The total autumn-winter season yield (tomato sorts: Bella, Elpida, Holland) is 6 750 kg The price per kg in winter season for tomato is $4	$4x6750kg = $27 000
		Total Annual Revenue: $43 875 **Net Income:** $43 875 - $30 000 = $13 875

113. Therefore, farmers are expected to generate at least $10 000 from the establishment of horticulture greenhouses. The recoupment of greenhouse initial capital in an attractive 1.5-2 year timeframe, which will stimulate scale-up the intervention to other communities using other sources of capital.

114. The project will also support the introduction of drip irrigation outside of a greenhouse environment where the cost is justified, and will also promote the use of lower cost versions such as siphon irrigation, which generate similar benefits in terms of drought resilience through improved efficiency in the application of water and fertilizer. Traditional drip irrigation in Uzbekistan costs $3-4,000/ha for horticulture and $4-5,000/ha for cotton. These figures are clearly beyond the reach of dehkhan farmers; hence the project in consultation with project participants and extension staff will experiment with a range of options which could be locally manufactured. This will bring the benefits of water efficient technology to subsistence households, organizing them as necessary into larger units in order to pool resources and achieve economies of scale. This will also generate social and institutional benefits.

115. Finally, *landscape-level* land rehabilitation and stabilization measures to be implemented by the project will improve overall land productivity, both for pasture and farmlands, as well as increase the functional integrity of the landscape, resulting in greater resilience to climate change impacts both overall and in the constituent productive areas. In Karakalpakstan, this practice can be extended to dekhan farm and rural local community levels (approximately 75,000 people). For example, in Kegeylidistrict (of a total area 3,788,100 hectares) some 15% (568,215 ha) of land will

benefit from the sand stabilization and pasture rehabilitation efforts; while in Chimbay district (of a total area 2,190,000 hectares) approximately 10% (219,000 ha) of the landwill benefit from the sand stabilization and pasture rehabilitation works. Muynak district will also benefit from these plantations, given that it is particularly affected by wind erosion and deposition of wind-blown sand.

116. The direct financial benefits from the plantations to participating land users who own sheep or cattle have been estimated below based on the results from applied research. The estimated annual weight increment of meat products resulting from landscape protection measures proposed by the project and profit generated from sheep sale at the local market is presented under four scenarios: (i) baseline (ii) with only mechanical protection from wind erosion (iii) with shrubs to both fix sand and provide forage and (iv) both mechanical and biological measures.

Table 5: Comparative analysis of economic benefits due to use of Saxaul as forage

	Using mechanical protection means		Without mechanical protection means	
Years	Weight increment of one sheep from forage from 1 ha	Profit (based on an estimated price of $5.2/kg)	Weight increment of one sheep from forage from 1 ha	Profit (based on an estimated price of $5.2/kg)
2	4.5	22	2.6	13
3	9.8	49	5.8	29
4	18.7	94	11.0	55
5	15.1	75	8.9	44
6	14.5	83	8.5	44
Total	62.7	313	36.8	184

Table 6: Comparative analysis of economic benefits due to use of Cherkez (shrubs) as forage

	Using mechanical protection means		Without mechanical protection means	
Years	Weight increment of one sheep per forage from 1 ha	Profit (based on an estimated price of $5.2/kg)	Weight increment of one sheep per forage from 1 ha	Profit (based on an estimated price of $5.2/kg)
2	11.0	55	6.4	32
3	11.8	59	6.9	35
4	32.6	163	19.2	90
5	35.0	175	20.6	102
6	34.6	173	20.4	102
Total	124.9	625	73.5	367

117. As can be seen, allowing sheep to graze amongst the proposed landscape-scale plantations, even on a single hectare, will result in both a considerable incremental benefit in terms of weight gain and this translates into a significant improvement in market value and hence household income. This is especially important given the low baseline average household income in the project area, and the differential between the with-project and without-project weight gain would be

greater in drought years, which is also when the extra income is most critical. The cost of mechanical protection plus cherkez seeds is approx. $100 per hectare; therefore the payback period is 4-5 years. Both the size of the investment required and the relatively short payback period make this project intervention potentially replicable, at least when the resources (capital and labour) of beneficiaries are organized collectively, which is part of the project model, through Component 3.

118. The project beneficiaries possess not only small stock such as sheep, which are relatively drought resilient but do not generate large unit income upon sale, as well as cattle, both for meat and milk. Studies[15] show that the average weight gain of cattle in target areas is 60.2 kg per year. The gain in weight, obtained in 100 hectares of saksaul plantations is 150.4 kg per year. The benefits from allowing cattle to access the proposed plantations to gain access to forage is presented below for two categories of project beneficiaries; subsistence dehkhan farmers and commercial farmers (who also commercialize dairy production, impacting regional nutritional security).

Table 7: Benefits to livestock keepers of access to plantations for forage

Beneficiary	Average herd size	Annual additional weight gain (kg) per herd	Additional income meat (at $7.5/kg)	Additional income dairy (at $.60/kg)
Dehkhan	5	451	3,382	
Commercial	200 (of which 70 dairy)	18,040	135,300	54,728

119. Initial estimations, based on small scale pilots for the introduction of the low/no till, laser leveling and drip irrigation measures, have shown thatland and water productivity in the target region can confidently be foreseen to increase by at least 15-20% and as high as 50%, depending on the combination of interventions and other factors. Communities of farmers and pastoralists will be empowered through the indigenous social structures at the sub-district and village level (Makhalla), which will be tapped and strengthened to improve ownership and community control mechanisms over the land rehabilitation activities. Furthermore, broader adoption anticipated as a result of dispersed demonstration activities through the most vulnerable districts of the region and specific support to land and water management to participating communities will help sustain the local livelihoods both in the short and over the longer term in the face of recurring droughts. Community institutions such as Makhalla and associated funds and their involvement in plantation employment programmes will be strengthened and will help institutionalize the adaptation objective of the project in the region.

120. To take an example of direct project benefits, sand stabilization and pasture rehabilitation work will employ at least 75,000 local community members (approximately 50% women) and beyond the project will provide regular seasonal employment for further rehabilitation and maintenance work by the local population for approximately 25,000 people. In parallel, environmental benefits will arise from the adoption of the methods of conservation agriculture that promotes, for example no till measures and crop diversification and efficiencies through intercropping. All of which will translate in turn into a higher and more drought resilient.

15 http://forestry.uz/slmproject/pub/Livestock_Economics_Engl_Um.pdf

121. Economic, social and environmental benefits for various beneficiaries of the project are summarized below (based on an analysis of information acquired during project design):

Table8: Summary of Expected Benefits, by category of beneficiary and type of benefit

Beneficiaries	Benefits		
	Economic	**Social**	**Environmental**
Dehkhan subsistence farmers(80%) and household plots	• Increased production and income will help facilitate access to government support; hitherto restricted to large farmers • Greenhouses (each to be accessed by multiple farmers for cost effectiveness) allow farmers to manage a micro-climate irrespective of drought or climate change, extending the cropping season and hence the quantity of crops produced as well as the types of crops which can be grown; all leading to higher incomes	• Increased production and income will facilitate access to government support; together resulting in higher status hitherto restricted to large farmers • Seasonality of income is mitigated through greenhouses, allowing crop production in the shoulder seasons, as well as improving household food security both directly through consuming the products as well as indirectly through greater purchasing power • Lead farmers / farms benefit from higher status as their success is highlighted through demonstrations and disseminated through the media • Reduced pressure for migration of individuals and/or families • Greater security of household water supply, as improved	• Conservation agriculture results in reduced erosion and runoff, increased infiltration and soil organic matter; together these increase the proportion of rainfall which gets into and stays in the soil. • This both increases plot resilience to drought but also starts a virtuous cycle of topsoil formation and enrichment.

		income can be allocated to domestic water storage	
Commercial farmers and farms (20%) (some dehkhan farmers also work on these farms)	• Sustainable income generation during drought years by application of climate resilient practices • Improved techniques and technology increases profit margins, generating more working capital for further productivity gains	• Lead farmers / farms benefit from higher status as their success is highlighted through demonstrations and disseminated through the media • Dehkhan farmers working on commercial farms are exposed to practices they may be able to adapt to their own plots	• Improved fertility and reduced runoff from land otherwise left fallow (bare, exposed to erosive rainfall, increasingly intense under climate change); increased productive potential for crops in future seasons
Livestock keepers (mainly dehkhan smallholders but also some larger cooperatives - shirkats)	• Establishment of forage base, consequently improvement of livestock and diary production • Lower prices for feed crops and development of livestock and diary production as a result of large scale forage cultivation; increased profit margin • Additional revenue by planting cover crops on unused land (about 50% of the total cultivated area) as a soil moisture conservation and fertility enhancement measure in the face of drought	• Seasonality of income is mitigated through production of forage through most of the year, improving household food security • Employment in creation and maintenance of plantations • Social relations between neighbours and classes of land users improved through cooperative landscape level planning and management processes; social capital generated can be applied to a range of other endeavours	• *Landscape-wide* measures work together to reduce wind and water erosion, enhancing the ability of the ecosystem to manage increasingly large fluxes of moisture anticipated under climate change (more intense rainfall) • Reduced rate of loss of vegetation during drought periods helps manage water flows on what would otherwise have been bare land during the next rains

	• Increased production and income will help facilitate access to government support; hitherto restricted to large farmers • Improved livestock production opportunities is an inherently drought adaptive outcome, assuming drought resilient choice of animals	which are only possible through collective action • Protection of villages from moving sands, which are engulfing both lands and buildings • Reduced pressure for migration of individuals and/or families • Greater security of household water supply, as improved income can be allocated to domestic water storage	• *New management systems* reduce overgrazing, thereby allowing restoration of ecosystem function and services. As services (turning soil fertility, rainfall and sunshine into biomass) follow from improved underlying function the beneficiaries have an incentive to maintain the arrangements, leading to sustainable outcomes

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

122. A number of alternative adaptation options have been considered with the government during the formulation of the project. A sector-specific approach has not been chosen, for example, a focus solely on irrigated agricultural sector, which has been the focus of many other initiatives in the country and region. Nevertheless, water use efficiency is a focus across the activities to be promoted by the project in light of the aridity of the area and the projected impacts of climate change, particularly increased frequency and severity of droughts. However, given that the projected climate change impacts in Uzbekistan and even within Karakalpakstan will vary across agro-ecological zones,an area-specific approach to adaptation has been selected; in short, in an adaptation context, a sectoral approach may not be the most cost-effective.

123. Karakalpakstan has been recognised in the SNC and other studies as the region most vulnerable to climate change impacts and therefore the cost effectiveness of adaptation related activities there should be high. Even within Karakalpakstan an empirical coefficient of vulnerability was calculated, presented in Part 1, to identify the most vulnerable districts, thus ensuring again the highest potential return in terms of reduction in vulnerability to investments by the project. Furthermore and unlike many projects, based on consultations in those districts, the focus is not solely on farming practices, but rather both farming and livestock production. This is particularly important given that many farmers in fact have a diversified income strategy, with both crops and livestock, and may use different areas and resources in the landscape for each. Climate change adaptation will require ever more flexible and diversified production and livelihood systems; hence the project is more likely to prove to be cost effective by investing in both irrigated agriculture and pastoralism, especially considering the broad social benefits such as greater income and household food security. The project will help strengthen and diversify the options by which these socio-economic objectives can be achieved. For example, by adding value, through introducing greenhouse based production technology together with drip irrigation for high value horticultural products; this extends the cropping season, makes production less subject to rainfall. Finally, the project will also address the contextual environmental conditions within which household plots are situated, especially in the driest areas (about 50% of the target area of the plantations), where arable land is regularly lost to wind-blown sand and salinization.

124. Assuming that the average dehkhan holding is 0.25ha, and given the average annual revenue of $5,125 from this plot[16], the losses avoided through the project at the level of base production unit will be significant, in addition to the costs avoided to the state and the social costs of relocating households and/or migration. Furthermore, cost effectiveness can also be viewed in terms of the costs which would otherwise have been incurred to reclaim land abandoned to increased wind erosion due to climate change, a scenario which is not speculative but is already being witnessed. These costs include allocation of large quantities of scarce fresh water to flush out salts, drainage works and improvements to the irrigation system both at plot gate and upstream. Given that the target area is at the end of the central irrigation system, it is unlikely for this water to be available, and even if it were, there may be political tensions created with users upstream. For all these reasons, the cost of keeping arable and/or good pasture land in production through sand fixation activities through the project (mechanical and biological measures) are clearly less expensive than either the costs of displacement of the settlements or rehabilitation of the plots.

16 http://www.xn--80abmghlx4ajd.uz (in Russian)

125. Despite the fact that Dekhkan householdsare the primary targeted beneficiaries of the proposed adaptation project due to their vulnerability and their importance to food production, especially meat and dairy, the subsistence nature of their farming practicesmeans that the project also targets larger farmers. Thisaffords the project greater opportunities to commercialize the practices and technologies which will be introduced through the project. This two track approach is more cost-effective (relative to outcomes and impacts, as well as by financial measures). In particular, thedemonstration of the benefits of good farming practices of conservation agriculture and water saving irrigation on large, consolidated land is anticipated which, together with other measures such as an appropriate regulatory environment facilitated by the project through component 2 and knowledge codification and advocacy of successful practices through component 4, is expected to result in broader uptake than only the target participants and therefore prove to be highly cost effective. This anticipated area-wide shift in trajectory in the target districts and beyond through a combination of 80% subsistence households (dehkhans) and 20% larger farmers and capacity building of extension services will trigger changes in farming practices for non-participating farmers as well. Even if this scenario proves to be only partly achieved, the wide ranging benefits would still be considerable vis-à-vis the costs and would represent a better return on investment than an alternative such as a highly technical approach to only one aspect of water use efficiency in the irrigation systems. Finally, the element of participatory planning of landscape wide rehabilitation is likely to be particularly cost effective.

126. It is important to point out that all the farm level measures for resilient agricultural production which will be introduced and promoted are known to be inherently more cost-effective as they represent good international practice of conservation agriculture and known to require less input and maintenance costs. In addition to inventorying such practices, the project will facilitate the selection and adaption of suitable practices amongst this inventory on a range of types of farms. This diversification and localization strategy is the most likely to prove cost effective, especially in terms of the impacts felt after the project is finished. Furthermore, the approach to water saving irrigation practicewhich will be promoted by the project will involve a flexible approach to the farms that are already covered by the central irrigation network; and the efficiency of water application resulting from this dimension of the project will be highly cost effective in light of the current low efficiency of that system. While the scope of the project does not allow it to address inefficiencies through, for example, losses in central conveyance arteries or further upstream from the project area, it will at least facilitate greater water use efficiency at farm level, and in the process build capacity to implement proven options to do so. For example, drip irrigation can increase efficiency by 3-4 times due to water savings compared to traditional watering 2 times the yield increases with a factor of 1.5-2 due to creation of optimal conditions of water and air for crops, as well as in connection with the possibility of simultaneous introduction of water-based fertilizers (fertigation) and herbicides.

127. This will translate into both financial benefits as well greater resilience at the household level. Locally produced drip irrigation or siphon irrigation will be promoted, which will be cost-effective method because they will be lower cost, will fit local requirements, be easier to maintain than complex systems sometimes imported and will help induce or expand a supply chain, resulting in benefits also to agricultural supply centres in the area if the scale of implementation of the project is achieved (both directly through the project and through replication by other parties).

128. In summary, although it is not possible in advance of the project to accurately quantify the equivalent monetized value of the expected benefits from this range of interventions and progressive approach for the purpose of cost-effectiveness analysis, the government of Uzbekistan is confident that good practice has been followed in project design to maximize the quantity, value, distribution and sustainability of the benefits vis-à-vis the funding being requested for the project.

For example, even those farms which do not benefit from the centralised irrigation will have the opportunity to improve their water efficiency through the options promoted and technically supported through project activities, such as water efficient furrow, surface water irrigation and rehabilitation of wells.

129. The direct benefits from the landscape-scale land rehabilitation and management approach include improved farm level production, reduced losses due to wind erosion and the monetary equivalent of the fodder harvested which would otherwise have to be purchased or land re-allocated away from other uses to grow fodder. This last benefit is calculated based on the figures presented below[17]

Table 9. Cost of fodder in Karakalpakstan

Items (fodder)	**Price, in UZS per kg***
Hay from reeds	50
Rice residues	50
Cotton meal (residues)	450
Cotton peelings	350
Mixed fodder	400

*$1=1,917.64 as of 24 August 2012

130. The macro and long term effects of the current policy of water management is readily apparent from the history and projected area of the Aral Sea (Annex 1), which is the end point. Depending on the price of cotton and cereals and directives from the central government, this pattern may continue. However even extension of the irrigation system were an option in the project area, for example as the result of a very major investment upstream (on the order of hundreds of millions of dollars) in reducing conveyance losses throughout the system (reduced leakages, covering arteries and reservoirs to reduce evaporation). For example, in 2008 construction of Chartak water storage was completed in Namangan province (Fergana Valley), which costs was $490,000. Similarly, in 2009 Rezaksay water storage (660 mln m^3) was commissioned in Namangan province, financed through a soft loan of $46m from China.

131. In any case the farm gate costs would still be considerable: $3,000-4,000/ha. This can be compared with the proposed project alternative of laser levelling (in the case of irrigated plots) at $320-350/ha and low till conservation agricultural practices (mainly for pasturelands) at under $35/ha. Under a realistic policy and climate scenario, this is the higher risk adjusted return-on-investment option. Where the project does introduce irrigation it is primarily in the context of a managed ecosystem (greenhouses and locally adapted drip irrigation) in order to reduce the weather dependence of value addition.

132. In short, as a result of the project approach multiple types of land users will both benefit from a higher income as well as from awareness of the benefits of adaptive practices. This will be

[17]**Source:** *A Study from the UNDP/GEF project Achieving Ecosystem Stability on Degraded Land in Karakalpakstan and the Kyzylkum Desert*

reinforced through the extension services provided, which will have a focus on putting climate change theory into practice through Climate Field Schools, including improving awareness of the existence, value and how to interpret drought early warning and other forecast products. Many if not most early warning systems are not cost effective because of this missing element. At best the reports stop at government offices. The capacity built of farmers regarding anticipated increased climate variability and droughts and longer term aridification will be an important – if difficult to measure – aspect of the cost effectiveness of the project; both directly in terms of savings through reduced water usage, reduced land salinization (which can otherwise come to a point of not being economically reversible) and indirectly through, for example better value being derived out of government investments in weather forecasting. Finally, the sustainability and the bigger picture cost effectiveness will be assured through an investment, under Component 4, in facilitating in through a multi-stakeholder process the promulgation of an enabling legal and regulatory framework for upscaling practices proven to be successful through the first three components.

133. The agricultural GDP of Karakalpakstan is approximately $250 M; the effects of a drought such as in 2000, where 20% of the crops were lost, equates to some $50 M given the current GDP, not including the cost of food assistance, water tankering and of relocating a number of settlements. This magnitude of drought is expected, on the basis of multiple sources, to become more frequent. If even a 25% reduction in these losses could be achieved through the upscaling and institutionalization of the approach to be demonstrated by this project, and given a projected frequency of two droughts of this magnitude per decade in the immediate future, the savings would equate to $3.5m per year. Hence after two years the cost calculation of the project would be positive.

134. Given the bigger socio-economic picture - together with the evidence of shrinking source (glacial) and sink (inland seas) areas in the hydrological network – it is clear that a new approach to water management is required. While not proposing a master plan, the project will pilot key elements which can contribute to evidence-based decision making. These start from accurate and real-time weather information through adaptive practices at plot and landscape scale and extension support which is better equipped to inform and assist subsistence households who are the most vulnerable to the impacts of climate change. These elements are enhanced by support for climate change modelling for planning over longer time frames, clear documentation and dissemination of successful practices for future reference and the facilitation of an enabling regulatory and legal environment, with policies which incentivize adaptive practice. While current policies tend to be focussed on maximizing output and value added, the project will be well equipped by the end of its seven year time frame to influence policies with respect to cost effectiveness; both as defined financially and when taking into account environmental externalities.

135. By way of a summary, various dimensions contributing to the overall cost effectiveness of the approach proposed by the project laid out on an output-by-output basis Table 10, below.

Table 10.Cost Effectiveness of Project, by Output

Programme Component	Programme Cost (USD)	Number of Beneficiaries	Losses Averted/ Benefits Generated	Alternatives to Programme Approach and Cost
Output 1.1 Upgraded observation and monitoring infrastructure (e.g. 2 Doppler water meters, automatisation of 8 met stations) for effective data reception and transmission	671,000	Hundreds of thousands of land users throughout Karakalpakstan; potential national benefit if system replicated nationally	Without an improved hydrometeorological infrastructure mis-timing of planting will continue to occur as a result of changing patterns of rainfall attributed to climate change. This has resulted in major crop losses, income at household level and sometime the need for food assistance Apart from the benefits of the project itself to the 40,000 direct participants, the data network will be of value heavy water related infrastructural investments which the government and/or donors may undertake, which typically cost millions of dollars	If nothing is done the cost will be zero, however there will continue to be an inadequate foundation for credible drought warnings and associated losses. Furthermore, the ability to monitor changes in weather due to climate change will continue to be restricted, undermining the quality of scenario planning and strategic decision making for Karalpakstan Investments which are weather dependent, such as an improved irrigation system, will not be cost effective if they do not benefit from a sound weather/climate evidence base
Output 1.2: Multi-module platform for integration of data flow from hydro-meteorological observation network to end users	368,000	Hundreds of thousands of land users throughout Karakalpakstan; potential national benefit if system replicated nationally	The investment in Output 1.1 would be sub-optimal if this new, real-time monitoring system were not integrated into existing systems. Without the project the existing system, although useful in terms of spatial coverage, would not be sufficiently timely to be of practical use at farm	An alternative approach could be to continue to invest in a system which has a scientific value and of use to some ministries, but of less value to direct land users. Such an investment would be a sub-optimal use of scarce capital and would continue to undermine the credibility of the extension system in terms of

			level to influence planting date and other decisions, resulting in continuing losses due to an erosion of the value of knowledge traditional weather patterns	practical advice; this would be exacerbated under a scenario of increased weather variability due to climate change
Output 1.3: Drought early warning mechanisms (indicators, gauges, warning distribution mechanisms etc) to minimise impacts of droughts in place and functioning	160,000	Hundreds of thousands of land users throughout Karakalpakstan; potential national benefit if system replicated nationally	The investment in Output 1.2 would not be fully taken advantage of without a system to translate data, however accurate and timely, into a widely distributed system of early warning. Losses avoided can include crop losses, some forms of infrastructure due to flood warnings, as well as improved efficiency of delivery of various forms of assistance to the affected populations While losses will occur during a drought under any scenario, the better and earlier that weather information can be translated and disseminated to influence farm level decision making the greater these losses can be mitigated directly by the land users, which is an efficient option (to be complemented by other measures and actors) and builds management capacity	Alternatives to a drought early warning system could be water provision investments in the form of water storage structures at the domestic level but with storage quantity constraints and/or centralized reservoirs, with the associated distribution costs. Furthermore there would be high evaporation losses; underground storage would mitigate this but construction costs would be much higher. Another alternative would be water tankering, which has limitations in terms of sufficient capacity at peak times as well as the cost of purchase or rental and fuel
Output 1.4: Science-based extension services for	58,000	a) 40,000 farmers	Productivity gains will be significant as a result of a	The Climate Field School approach will reduce potential

subsistence dekhan farmers established to assist in farm-based climate risk management, including sub-district, community level ClimateFieldSchool / Extension (CFS /E) established for direct outreach to farmers and localized training in adaptation practices		directly; 40,000 households comprising approximately 200,000 people b) Larger numbers in Karakalpakstan due to improved extension service taking promoting adaptive practices; ultimately national benefit if replicated nationally	science-based approach to extension service delivery as well as a strengthening of the extension services and of their credibility, especially among the currently under-services subsistence farmers.	losses due to lack of preparedness and understanding vis-a-vis the alternative, business-as-usual without project alternative. The capacity built through the CFS/E will also result in maximum value being achieved from the investments in the early warning system and the observation and data integration system which undergrid it, as farmers will know how to interpret and react to weather information
Output 2.1. 40,000 Dekhkan farmers have adopted climate resilient conservation agriculture practices (e.g. low till, mixed cropping, fodder production, and residue crop soil covering adopted measures adopted at 80,000 ha of dekhkan farms)	456,200	40,000 farmers directly; 40,000 households comprising approximately 200,000 people	Conservation agricultural practices have been found from other projects in Uzbekistan and elsewhere to translate into sustained medium term crop yield increases of 15-20% as well as improvements in the natural capital of the farming enterprise, which is soil health, in particular given the low rate of topsoil formation in an arid environment. Given that the average annual income of a dehkhan farmer is up to $1,900 (assuming the maximum	An alternative approach is to subsidizing farm production income through the project period as a safety net pilot for possible take up by government. This would compensate for the financial effects of droughts or other weather risks associated with climate change; for example through floor pricing (minimum prices guaranteed by the government irrespective of the market price) however this would be a huge strain on the

			allowable plot size of 0.35ha), this would result in an additional income of some $285-379 per year	already limited budget of Karalpakstan.and is therefore not considered to be viable Crop yields could be increased through subsidizing inorganic fertilizer, however this would not address the water use efficiency constraint. Furthermore, the response function of crops is subject to the most limiting factor, which in this case is typically water rather than nutrients, especially in drought periods, and these are likely to increase in frequency and severity with climate change.
Output 2.2. 40,000 Dekhan farmers have adopted water saving irrigation practices (e.g. land levelling, furrow and drip irrigation systems adopted at 80,000 ha dekhkan farms to improve farm-level drainage and minimise salinisation)	482,700	40,000 farmers directly; 40,000 households comprising approximately 200,000 people	The proposed project investments of land leveling (to improve the efficiency of traditional basin flood irrigation), improves yields by up to 50% .This would increase the average annual income of a dehkhan farmer by approx. $950. The proposed drip irrigation and fertigation are expensive but will yield significant results. These benefits from all of these interventions would be in the forms of farm level income increases, greater food availability and variety in the project districts and both during droughts, due to greatly improved water use efficiency.	Alternatives include investments in improving water supply through reduction in conveyance (irrigation channel) losses, currently at approximately 50%. However given the extensive nature of the system this would be prohibitively expensive ($4,000 per ha to upgrade the system on farmland plus considerable costs for the system to get the water to the field). In any case the target farmers, who are subsistence, are not prioritized in the centralized water distribution system. Hence the return on investment with respect to reduction of vulnerability, this would be less

			They are also be cost effective in terms of a return with respect to resilience to climate change, through diversification of income source They will also contribute to agricultural value chain demand, as the drip irrigation systems will be produced in country after being adapted to local needs and maintenance resources; this also enhances the sustainability of the investments	cost effective than the proposed project intervention. Furthermore, the fact that the system is centralized, while the budget constraint of the project would only allow part of the system to be upgraded, would mean that the losses in the non-rehabilitated parts of the system would affect the efficiency of the investment in the project area.
Output 2.3. 40% of targeted dekhan farmers have established horticulture greenhouses on 20,000 ha of farms to minimise impacts of droughts on farm production.	338,500	16,000 farmers directly; 16,000 households comprising approximately 80,000 people	The cost benefits of greenhouses are related to the creation of a controlled micro-climate which mitigates the temperature and moisture constraints anticipated under climate change to exacerbate crop production, especially of water intense but high value horticultural products. In particular, this investment option allows for increasing the number of crops by extending the cropping seasons into the spring and fall, especially when combined with fast maturing varieties, a trait which will be filtered against through the inventory of crops to be undertaken through Component 4. This is particularly important given that impacts of climate change is already manifest in	An alternative use of project funds is the construction of water storage along the irrigation distribution network to manage drought periods; however in addition to being expensive this would not address the fact that 90% of the water source lies outside the country and hence may not be reliable, and would not have the effect of greenhouses of extending the growing season

			terms of more marked seasonality, making planning more difficult. The revenue from early and late horticultural crops not otherwise possible is considerable; if the project bears the cost of a greenhouse, the farmer will generate a profit of $13 875 per year under tomatoes, including all operational costs. If the farmer bears the cost of the greenhouse the repayment period is 1.5-2 years. The demonstration effect together with the short repayment period is expected to result in wide replication, initially among the middle farmers, filtering down as economies of scale for greenhouse production kick in, lowering the barrier to entry	
Output 2.4. Legal and regulatory framework put in place to support well tested farm-based adaptation measures for replication and upscaling	100,000	Potentially hundreds of thousands of indirect beneficiaries	This investment is likely to be highly cost effective, given the history of relatively poor replication of the various project activities in Karakalpakstan, which is attributed in part to the barrier of a lack of an enabling environment for adoption outside of the project context. This investment will both improve the returns on this project directly as well as for future activities of other	The alternative scenario is business-as-usual, which has no direct financial cost but represents an opportunity lost in terms of reduced likelihood that the findings of the project in terms of promising practices and investments in early warning systems and in documentation will result in replication

			projects, especially when combined with a strengthening of the extension services for subsistence farmers; as well as the establishment of relationships with centres of excellence who will serve as repositories of project knowledge and the popular dissemination which will occur through the media- both through Component 4	
Output 3.1. Local saksaul and tamarix plantations deliver sand stabilisation and soil desalinisation function for 1,042,094 ha of farm and adjacent farmlands, based on wind models and comprehensive landscape rehabilitation and management plan	1,107,200	a) 40,000 dehkhan farmers directly from fodder from plantations + benefits from healthy ecosystem; 40,000 households comprising approximately 200,000 people b) Indirect sand stabilization and desalinization benefits to neigbouring land users in target area	There are both direct and indirect benefits, both environmental and financial. The investment in the comprehensive land rehabilitation plan allows for the relationship between state owned (mainly poor quality grazing) and privately owned farm land to be understood systematically, so that interventions have a mutually reinforcing effect. The direct benefits include improved farm production, reduced losses due to wind erosion, the monetary equivalent of the fodder harvested which would otherwise have to be purchased or land re-allocated away from other uses to grow fodder. The benefits of allowing farmers and pastoralists to graze their animals on	An alternative is to do nothing (cost nothing), however this will result in continued wind erosion and associated salinization, with very large cumulative costs directly to farmers, indirectly to the economy and to the environment. Pastoralists will continue to spend money on fodder, especially during drought years. Eventually erosion and sand and salt deposition on fields will render some farms unusable, depriving many households of their income, who will become wards of the state either through food aid and/or through migration to urban centres, with the associated financial and social costs. Another option is to invest in

			improved rangeland under trees and shrubs are significant: 1 sheep grazing on 1ha over the project life will generate an increment in weight worth $135-$270, depending on the type of fodder. Cows will increase their rate of weight gain dramatically, resulting in the equivalent of $675 worth of additional meat per animal per year.Dairy production would also benefit; combined with alfalfa in the winter, would increase revenue per cow by $55. Given that 70,000 ha will be planted directly by the project on private land, complemented by the government on state land, the financial benefits will be very large, which will also encourage replication to the target 1million ha. The plan will also lay the foundation for upscaling by other players who are currently or may in future work in the area. Together with the investment in the consultative process behind the plan, this will ensure the cost effectiveness of the sequence of investments by various parties in the broader project area.	the plantations but, as in the past, without investing in the modeling required to take into account shifting wind patterns resulting from climate change, which will limit the effective lifespan and hence cost effectiveness of the plantations
Output 3.2. Community management scheme for planting and maintenance	174,500	75,000 employed to plant trees	The project but will create employment opportunities for a large number of community	An alternative option would be to use government extension workers to plant the trees,

established as community employment scheme for landscape level adaptation		(50% women)	members, building on existing rural employment programs, as well as ongoing employment and/or income opportunities through maintenance and fodder harvesting for the life of the plantation (approx. 25,000 people). The costs of establishing the plantations will be borne by the project, however their combined adaptive, environmental, financial and social benefits are high, and calculations show that replication *without* project capital would result in recouping of costs over viable periods (for example 4 years for sheep).	however this would forego the employment creation and capacity building benefits at community level
Output 3.3. Cooperative management system for landscape rehabilitation and management established to enhance community control and ownership arrangements	442,200	75,000 employed to plant trees (50% women)	Previous attempts to establish plantations have ultimately failed due to lack of clarity over tenure; a major incentive in this case is community level use rights , Designing this element based on lessons learned will prove cost effective through avoided deterioration of the plantation investment as a result of a perceived open access regime. The loss avoided would be the cost of Component 3, totaling $2,800,000	Alternative management options include government management, however this would not create the social capital which is critical to the sustainability of landscape scale interventions, which in turn are necessary to address ecosystem function and as such improve the buffering capacity to climate change impacts. At this scale the community must be involved, there must be institutional arrangement in place to ensure collective action

Output 4.1: Inventory of all tested agronomic and water saving measures to map out successful practices	78,400	National benefits as an evidence base for future activities by projects and government	National benefits as an evidence base for future activities by projects and government. This element, which will take place early in the project, will be critical to ensure that project funds are not invested in crops and practices which are not adaptive, viable and acceptable under local circumstances	An alternative approach would be to skip this step to ensure faster results; however the project life of 6 years, which is significantly longer than the average project, has been specifically decided in order to allow the establishment of a proper foundation for the specific activities
Output 4.2: Analysis and lessons learned for climate resilient agricultural and pastoral production systems in arid lands documented and disseminated through printed and web-based publications	135,000	National benefits as an evidence base for future activities by projects and government	In order to ensure the cost effectiveness of the investments, it is imperative that the lessons learned be documented and disseminated over the course of the project; hence this relatively small investment will prove to be of significant value via both sustainability and replication	Another approach would be to minimize the budget for this item, however this would represent a false economy due to its significance with respect to sustainability and upscaling
Output 4.3: Quarterly farm and pasture land demonstration meetings with participation of national, local authorities, media and communities delivered	60,000	National benefits as successful practices highlighted through national media	In order to ensure the cost effectiveness of the investments, it is imperative that the lessons learned are disseminated over the course of the project. This will also help generate buy-in for the project by a variety of critical players, both increasing the chance of project success and of replication; in which case the cost of the project will be spread over a greater number of future beneficiaries / hectares	Another approach would be to minimize the budget for this item, however this would represent a false economy due to its significance with respect to sustainability and upscaling

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 programmes of action, or other relevant instruments, where they exist.

136. The objective of this project is consistent with national priorities as expressed through the Second National Communication (SNC), which highlight the particular vulnerability of the agricultural sector to climate change, especially in arid parts of Aral region, and specifically in the provinces of Karakalpakstan, Korezm and Bukhara. For example, the SNC notes that the drought of 2000-2001 left 79,000 farm households unemployed in target areas of Karakalpakstan,.The SNC further states that Uzbekistan is the main water consumer of the region of Central Asia; which is not surprising, as it also the most populated country and has an economy largely based on irrigated farming. Yet almost all (90%) of its water resources come from mountains located in other countries. Adaptation is therefore a national strategic imperative and will clearly require more sustainable use of water, starting with implementation of low water consuming technologies and more effective irrigation management, as will be promoted by the project. It is important to note that these activities will come in the context of a package (land use plan, extension services to currently underserved populations with a view to increasing income to the level where they can buy in services if necessary, promotion of a regulatory environment and media coverage) to maximize the likelihood for upscaling both during and following the project. Furthermore, the Welfare Improvement Strategy Paper – WISP of Uzbekistan for 2008-2010, which determines the economic policies and development priorities and also goals and priorities in the sector of agriculture, mirrors many of the project foci.For example, the section on agriculture focuses on the following restructuring in the medium and long terms:

- ✓ Gradual improvement of selected crops to increase cash crops with higher yields
- ✓ Utilization of new potential varieties of plants and animals, new agro-technologies and agricultural practices in order to enhance the productivity of crops and of livestock
- ✓ Substantially increase capital investment in irrigation water supply and implement efficient water utilization technologies
- ✓ Improve the economic dynamics between all actors in the agricultural sector.

137. From a less technical perspective, the proposed measures within the framework of this project arealso fully consistent with national and state priorities of the Sustainbable Socio-Economic Development Programme. The stated priorities include objectives consistent with the project activities, such as:

- The development of livestock and fodder production for sustainable increase of incomes of dekhkans and farmers in the arid regions of Karakalpakstan

- The development of greenhouses and aviculture on farms to ensure food security

- Development of irrigation networks and the transition to more economical methods of irrigation (i.e.drip irrigation).

138. Each of these priorities will be addressed to various degrees by the project, principally through Component 2. Overall, through Component 2 the project will introduce adaptive crop and pasture practices, infrastructure, management skills (outputs 2.1, 2.2, and 2.3), as well as build on Component 1 by working with government to improve the extension service for dissemination and

support; and lay a foundation for Component 4 (knowledge management), which will involve documenting what has worked and why of the adaptive agronomic practices introduced. Finally, a progressive regulatory and legal and regulatory framework (output 2.4) will be promoted. Together these measures will help ensure the long term cost effectiveness of the related project investments as well as helping to ensure institutional sustainability.

139. The Social Economic Development Plan specifically for Karakalpakstan, for 2007-2011, prioritises stimulation of livestock production.As the development of livestock production directly depends on such factors as fodder production, water supply, productivity of pastureland, these elements of the project contribute directly to this priority. The project will take a balanced approach towards supporting Dekhkan farmers, who more often than not are also engaged in pastoralism. The drought of 2000/01 and 2008/09 has affected the agriculture sector of Karakalpakstan, especially the downstream districts, because of lack of planning, prognosis, and water control at the regional, national, and local levels on the Amu Darya River. The most significant losses were in livestock production; 50-55% reduction of livestock capita in 2009 compared with 1999. One of the reasons for such overwhelming losses was the failure to prevent or at least minimize impacts through adequate preparedness, prognosis and planning for contingency response.

140. Before the drought of 2000/01 both farming and livestock production were equally developed. The abundant pastureland and irrigated land of the northern districts of Karakalpakstan allowed the operation of both farming and livestock production. In fact, farmers in these districts, who earned cash growing cotton, rice, and other grain, are investing this gain in livestock production. While perhaps a risk diversification strategy, and in spite of the drought adaptive qualities of certain types of livestock under certain management regimes, the drought of 2000/01 caused such large losses in livestock capita that the government of Uzbekistan had to make significant changes in the priorities of its Social Economic Development Programs, shifting its attention in such areas to improving livestock production. However the principal barrier to livestock production for the districts of Karakalpakstan is the insufficient forage due to scarcity of water resources. As such, the emphasis of the project on plantations which have forage value and of a landscape level management plan which includes rangeland and does not shy away from land tenure issues, together with technical interventions and the presentation of options such as zero or stall grazing will help get at the root barriers behind the more effective implementation of this government priority. Furthermore, evidence of success can confidently be foreseen to open the doors to government support for upscaling these activities, contributing to the sustainability and leveraging of project investments.

141. More specifically, the project represents direct support to the government policyAnnual Livestock and Diary Production Development Programme, which has been approved by Ministers Council of Karakalpakstan. This Programme intends to stimulate livestock and diary production through capacity building, training and scale-up the proven methods. Furthermore, the project preparatory survey and interviews held with government officials (such as Chief of Agricultural Sector at Ministers Council of Karakalpakstan, Chair of Farmer's Association of Karakalpakstan, local Khomiyats in addition of course to land users themselves)quickly led to the conclusion that a focus of the project should be on activities related to forage production and formation of a forage base (plantations, landscape management under Component 3) in order to demonstrate that it is possible to enhance the stability of livestock production in drought years.

142. Similarly, in response to dramatic losses from recurring droughts during 2008/09, the government ordered farmers to grow fodder as livestock were dying to i) place 3000 ha of land under drip irrigation ii) to construct green houses in all district and iii) to increase grace loans for drip irrigation, again reflecting government priorities. The project represents a direct support to the government's policy and priorities for a long term optimisation of agricultural production under the conditions of recurring droughts and long term aridification. Even though these government

directives have strong adaptation potential, the project will help enforce them by adressing the essential institutional capacities, knowledge base through a demonstration of concrete adaptation measures directly in the field and public awareness of successful options through media and policy briefings for officials which together can help shift the sector towards an adaptive appraoch as the new 'business-as-usual', as opposed to a currently prevailing emergency response apparoch.

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

143. The relevant national and sub-national technical standards or regulations that this project will need to comply with are the following:

(i) Regulations, standards and requirements for the installation of irrigation channels on the farms and well rehabilitation:

144. There is no written requirement for construction of irrigation channels. Usually a farmer who wants to construct a channel applies to district agricultural and water department with a request and justification for construction of a channel. After approval the farmer sends a letter with the approval to the district Khokim (head of district administration) with a request to allocate land under the channel. After obtaining the estimate documentation, the farmer can proceed with the construction.

145. The installation procedure requires approval from the State Committee for Geology and Mineral Resources (Goskomgeology). In this case a farmer applies to Goskomgeology via BISA with a request. Goskomgeology, in the case of availability (debit) of ground water resources, who in light of quality and quantity informs the same of their decision. In the case of a positive response, technical documentation is prepared and the farmer applies for a permit with the State Committee for Nature Protection (Goskompriroda). Again, in the case of a positive response, the farmer can proceed with the installation. The water limits are defined and set by MAWR and Goskomgeology.

146. The Law "On Waters and Water Use" (1993, last revised in 2009), regulates water relations and the main objectives are ensuring efficient water utilization to cover the needs of population and sectors of national economy, protection of water against polluting, contamination and exhaustion, prevention and avoidance of harmful impacts on waters, improving water bodies as well as protection of rights and legitimate interests of enterprises, institutions, organizations, farmers, dekhans and citizens relevant to the water use relations.

(ii) Regulations, standards and requirements for the installation of meteorological stations and gauges:

147. A set of requirements is to be met when designing and implementing the observational hydro-meteorological and climate monitoring networks and measurements as stated in the respective chapters of the *WMO GUIDE TO METEOROLOGICAL INSTRUMENTS AND METHODS OF OBSERVATIONS* WMO-#8[18])

148. The siting of the meteorological stations and water gauges are regulated, respectively, by: "The Guide for Hydrometeorologial Stations and Gauges", iss. 3, part 1, Hydrometeoizdat, 1986,

18 http://www.wmo.int/pages/prog/gcos/documents/gruanmanuals/cimo/cimo_guide-7th_edition-2008.pdf

p.299 and "Guide for Hydro-MeteorologicalStations and Gauges", iss. 6, part 1, Hydrometeoizdat, 1978, p. 383. These provide general guidance with respect to the siting of meteorological or hydrological stations and are designed to ensure compliance with the following standards:

1. The plot for the proposed station or gauge should represent the typical natural behavior of the environment and of the object itself (meteorological parameters, river or lake) so as to provide the measurement that is adequate to most typical conditions of heat and water circulation /runoff formation.
2. The location of the proposed station/gauge must be selected in a way which ensures easier and more accurate interpolation of the datameasuredthrough the existing observation network.
3. The geometric form and dimension of station or gauge plot should strictly correspond to prescribed requirements given in documents above.

(iii) Regulations, standards and requirements for large scale re-plantation works:

149. In order to reverse the trends of soil erosion and land degradation large scale re-plantations and reforestation / afforestation are currently promoted by the national law in Uzbekistan. Therefore, the project will not require any EIA compliance in this regard. In fact, in order to combat desertification the main Administration on Forestry under the Ministry of Agriculture and Water Resources implements the long-term and comprehensive programme on forest planting. During the last years forest seedlings were planted on approximately 20,000 ha of lands in Karakalpakstan. The Forestry Administration mainly applies two approaches to implementation of saksaul plantations: seeding and planting seedlings. Seeding is much cheaper that the seedlings planting; however the latter is proven to be twice efficient. The current level of available resources allows covering up to 350 ha per day in all regions of Uzbekistan. Planting usually takes place during the period from December to March without any watering though this is desirable. The approximate survival rate of seedlings is about 70%.

150. Currently, the National Programme on Forests Development for 2011-2015 has been adopted by the Minister of Agriculture and Water Resources of the Republic of Uzbekistan (Decision #7/5 of 29 October 2010). This Decision stipulates planning of forest plantings and corresponding costs for each district in the country. This programme also envisages wider involvement and more inclusive participation of local population in utilization of the public forest lands located at desert and mountainous areas. The project will support the implementation of this policy direction through Component 3 on landscape scale land rehabilitation.

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

151. This is the first large-scale adaptation project in Uzbekistan. This is also the first attempt ever to tackle the complex issue of climate change induced risks of intensified droughts in a comprehensive way by engaging at local farm, broader landscape and institutional levels. However, there are number of related initiatives in the country and specifically in Karakalpakstan that will require close coordination and it is anticipated that in certain cases partnerships will be developed.

152. UNDP is investing $800,000 in climate risk management project in Uzbekistan as part of the multi-country programme for Central Asia (CACILM). The National project focuses on climate risk management in the region of Kashkadaria and a range of disasters including droughts, floods and landslides will be addressed through integrated land planning and institutional capacity for improved forecasting, preparedness and preventive response measures.

153. Karakalpakstan has received considerable attention in the areas of food security and poverty reduction. The following projects are in operation and will require close coordination through the technical working groups and steering committee. Most of the projects will be operationally closed by the time the proposed adaptation project will have commenced its activities, but will offer a wealth of knowledge material and lessons learned to build on. Particularly relevant initiatives both in terms of thematic scope and geographic coverage are highlighted and briefly described below:

UNDP/EC project "Enhancement of Living Standards with joint funding from the EU and UNDP" Total project budget: €3,850,000, project duration 2009-2012.

154. The Enhancement of Living Standards (ELS) Programme is financed by the European Union and implemented by UNDP has been working in various regions of Uzbekistan since 2005. The ELS focuses on the 3 regions of the Fergana Valley, where it helps regional authorities improve regional planning and test concrete actions to improve people's access to services in communities. The programme helps communities to mobilize themselves in a joint effort to rehabilitate basic infrastructure and access microfinance. The living standards ofthe rural population in Fergana Valley is largely dependent on irrigated agriculture and improvements of agricultural practices. Investments in appropriate irrigation infrastructures and drainage are required to support the promising sectors of rice and silk cocoon production. While cotton cultivation is predominant, fruits and vegetables are also grown by individual farmers on a smaller scale. Small scale private farming (dekhan) would benefit from improved distribution and marketing. Modern packaging and improved access to markets would support the potential of the local food processing industry. The project also has the component of improving specialized rural services, however, it does not address the categories that are essential for driving the farming practices towards adaptation through specifically tailored advice and demonstrations.

UNDP/GEF project "Conservation of Tugai Forests and Strengthening of Protected Area System in the Amu Darya Delta of Karakalpakstan" Total budget: $1,222,000.Project duration 2005-2011.

155. The tugai forests in the Amudarya Delta are of significant value and fast disappearing. Changes in hydrological regime of Amudarya, deficit and salinity of water and significant anthropogenic factor (cutting trees, cattle grazing, fires, non-sustainable use of forest resources by communities) resulted in great reduction of tugai areas. They are not sufficiently represented in the national system of protected areas. Tugai are significant not only as means of diverse habitats and as biological species, but also as a livelihood for local populations.

156. The project was aimed at conservation of the biodiversity in the Southern Aral Sea in Karakalpakstan through strengthening protected areas systems by creating of favorable environment and polyzonal biosphere reserve for demonstration of joint protection and sustainable use of biodiversity. Experience gained and best practices will be disseminatedto all national protected areas systems.

157. Within the framework of the project the Lower-Amudarya State Biosphere Reserve (BR) has been established. The purpose of the BR is conservation and sustainable use of biodiversity resources. Re-vegetation of dried up Aral Sea Bed and restoring existing forests along the Aral Sea shore has been conducted in the framework of the project. The project targeted an area of 80,000 ha for vegetation and had already covered 27,000ha. In 2008 GTZ also provided assistance for strengthening Farmers Associations.

UNDP/GEF project "Achieving Ecosystem Stability on DegradedLand in Karakalpakstan and the KyzylkumDesert" Total project budget: $ 2,787,000.00; Project duration 2008-2013.

158. The main objective of the project is to test, evaluate and promote innovative solutions to the problems of land degradation at a pilot scale in Kyzyl Rovat (Bukhara Oblast) and Kazakhdarya (Karakalpakstan) communities and replicate best practices in order to achieve ecosystem stability on degraded land in Karakalpakstan and the Kyzylkum Desert by planting local varieties that have both strong ecological and economic benefits for succession in desert and semi-desert ecosystems testing sustainable land management methods; Even though the project was operationally closed in January 2012 it will offer wealth of on the ground experience for re-plantation methods and the species that proved the most effective for stabilization of mobile sands. The project however did not consider the projected changes in climate change, particularly wind dynamics.

UNDP/GEF Project "Integrated Water Managementand Water Efficiency Plan for Zarafshan River Basin"Total project budget $1,205,451, Project duration 2010-2013.

159. The overall objective of the Project is to develop a National Integrated Water Resources Management and Water Use Efficiency Plan for Zarafshan River Basin of Uzbekistan, to strengthen the legal and regulatory framework for the water sector, and to support the integration of water management issues into relevant intersectoral policy frameworks. The project undertook efforts to improve the legal and institutional framework for Integrated Water Resources Management; Improve Water Communal Services and Utilities within the Zarafshan River Basin of Uzbekistan; and introduce the Integrated Water Resources Management and implementation of a Water Use Efficiency Plan for the Zarafshan River Basin of Uzbekistan.

UNDP/GEF Multi-country Capacity Building Project of CACILM (Central Asian Countries Initiative for Land Management) Total budget of $780,000. ProjectDuration 2010-2012.

160. Five Central Asian Countries with the support of the international donor community have worked toward sustainable land management and reverse land degradation – through the Central Asian Countries Initiative for Land Management (CACILM). CACILM's goal is to restore. Maintain and enhance the productive functions of land in Central Asia (CA), leading to improved economic and social well-being of those who depend on these resources.

161. The goal is achieved through implementation of measures and interventions reflected in National Programming Framework (NPF) developed in each CA country.This project is one of the multi-country level activities on CACILM implementation support mentioned above. The project objective is to increase capacity at the national and cross-country levels to develop and implement an integrated approach and strategies to combat land degradation within National Programming Frameworks. It particularly focuses on mainstreaming of sustainable land management (SLM) principles into national policies and legislation; resources effectively mobilized to support SLM initiatives; and improving interaction between state agencies and land users through human resource development.

UNDP-GEF Small Grants Programme

162. In Uzbekistan the UNDP-GEF Small Grants Programme has commenced its activity since 2005.

While the initiatives are local, they must result in global benefits, Although local initiatives may seem to be very limited in scale, they can result in global ecological benefits The goal of the SGP is to promote the improvement of global natural environment via implementation, by means of local people, of local initiatives designated to preserve and restore the environment by implementing and replicating sustainable natural resources management practices that improve people's livelihoods. Some of the small scale projects implemented by the SGP have adaptation benefits that will be captured and codified for consideration in the framework of the proposed project.

Table 11: Analysis of project complementarity

Project name	Description	Potential Duplication and Synergies
1. UNDP/EC project "Enhancement of Living Standards with joint funding from the EU and UNDP" with total project budget of €3,850,000 and project duration 2009-2012.	**Objective:** To improve the living standards through: 1) supporting the development of local development strategies; 2) empowering communities by giving opportunities for community-based infrastructure projects; 3) providing local population with access to financing.	No Duplication. The project also has the component of improving specialized rural services, however, it does not address the categories that are essential for driving the farming practices towards adaptation through specifically tailored advice and demonstrations. AF project will facilitate the broader sharing knowledge of adaptation measures and best agriculture practices through the regularfield-based demonstration meetings that will be writing up in the local and national media for adaptation advocacy. Such meetings will be organized on the project demonstration farms with participation of local authorities, other farmers, national government representatives and media. Demonstrations of concrete farming and pasture management methods that provide evidence of bringing benefits of greater food security and resilience to droughts will trigger the replication.
2. UNDP/GEF project "Achieving Ecosystem Stability on Degraded Land in Karakalpakstan and the Kyzylkum Desert" with a total project budget is $ 2,787,000.00 and duration 2008-	Test, evaluate and promote innovative solutions to the problems of land degradation at a pilot scale in Kyzyl Rovat (Bukhara Oblast) and Kazakhdarya (Karakalpakstan) communitiesand replicate best practices in order to achieve	No duplication. The UNDP/GEFis directed to improve the desert and semi-desert ecosystems by testing and planting local varieties and sand stabilization and soil desalinization did not consider climate change scenarios and wind models. The efforts of the AF project aimed at plantations will be based on wind dynamics. The AF project will use the land use

2013.	ecosystem stability on degraded land in Karakalpakstan and the Kyzylkum Desert by planting local varieties that have both strong ecological and economic benefits for succession in desert and semi-desert ecosystems testing sustainable land management methods.	experience, re-plantation methods and species proved as most effective for stabilization of mobile sands.
3. UNDP/GEF Project "Integrated Water Management and Water Efficiency Plan for ZarafshanRiver Basin" with the total projectbudget $1,205,451 and duration 2010-2013	The project objective is to develop a National Integrated Water Resources Management andWater Use Efficiency Plan for Zarafshan River Basin of Uzbekistan, to strengthen the legal and regulatory framework for the water sector, and to support the integration of water management issues into relevant intersectoral policy frameworks. The project strives to improve legal and institutionalframework for Integrated Water Resources Management; Improve Water Communal Services and Utilities within the Zarafshan River Basin of Uzbekistan; and introduce the Integrated Water Resources Management and implementation of a Water Use Efficiency	No duplication. The IWRM is the system of different tools for improving water use at all levels and for all water users, through institutional, legislative and technical measures. The AF project will apply new technical skills – two DOPPLER water meters, and will automate 8 meteorological stations. It will help to provide comprehensive and well-functioning drought early warning system.

	Plan for the Zarafshan River Basin of Uzbekistan.	
4. UNDP-GEF Small Grants Programme.	The goal of the SGP is to promote the improvement of global natural environment via implementation, by means of local people, of local initiatives designated to preserve and restore the environment by implementing and replicating sustainable natural resources management practices that improve people's livelihoods.	No duplication. As it was stated earlier,SGPcovers small territories and it is not designed for long term period. Someof the small scale projects implemented by the SGP have adaptation benefits and lessons that will be taken into account and considered for application in the framework of the proposed project. The use of successful experiences of these projects will allow AF project to spread them to other districts through extension services.

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

163. Research in agriculture in Uzbekistan covers a wider range of themes from a variety of biological methodsto advanced technologies in land remediationand irrigation. Some donor supported projects have also tested a variety of farming and pastoral methods geared towards increasing agricultural productivity. However, the results of this research, and event of farm-based applications of it on a farm plot scale, remain too scattered and unconsolidated to steer greater replication and upscaling. Documenting and consolidating existing good practices will help identify measures that have greater adaptation value and are cost-effective. Screening of these measures from the perspective of long term adaptation benefits as will be done through this project will be a first for Uzbekistan. Such an approach will also help determine the cost-benefit ratio and help promote various possible adaptation options which will have been adapted to local conditions fromexperience elsewhere reviewed as part of this component. The cost of the inventory exercise itself is not high. The main cost under this component falls under the public and media promotion of demonstration plots via organisation of quarterly farm and pasture land demonstration meetings with participation of national, local authorities, media and communities. The benefits from advocating for and presenting opportunities to replicate the benefits are believed to fully justify the costs of these activities. In terms of leveraging existing knowledge sharing mechanisms, the project will utilise the Central Asia portal and UNDP's Adaptation Learning Mechanism and others both to derive and share the knowledge and lessons learned.

164. In fact the project has a dedicated component to knowledge management (Component 4) in full recognition of the importance of knowledge codification and targeted dissemination for broader awareness raising and direct impact on policy for greater transformation in farming and pastoral practices to achieve resilience to climate change risks. The project will apply three key methods to knowledge management: (i) a comprehensive inventory and synthesis of existing knowledge base, including the lessons that have emerged from related projects and programmes (ii) dissemination of international good practice of conservation agriculture, water saving techniques and agro-pastoral production that arenot only increase productivity under the current climate variability but also enhance long term resilience to climate change (iii) systematic codification of emerging lessons and knowledge during the project implementation. This three pronged approach to knowledge generation and dissemination will be reinforced through publications, regular field based demonstration of results and targeted dissemination through media and meetings with national, local authorities and communities of farmers. Concrete deliverables of the project in knowledge management are described in greater detail under the dedicated Component 4.

H. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations.

165. The project has been requested by the Government of Uzbekistan, specifically the Uzhydromet Centre that hosts the Designated National Authority for Adaptation Fund in Uzbekistan, to develop a project in this area. As a result, an initial consultation meeting was held to outline the critical adaptation priorities as they have emerged in the SNC and AF requirements for project eligibility. The concept has been developed in close consultation with the following key stakeholders:

Organization	Name	Position
Centre of Hydro-meteorological Service under the Cabinet of Ministers of the Republic of	Mr. ViktorChub	General Director, UNFCCC Focal Point for Uzbekistan, AF GDNA
	Mr. AlexandrMerkushkin	Deputy Head of service on monitoring of atmosphere air,

Uzbekistan		surface waters and soils pollution
	Mr.Sergey Klimov	Head of Hydro-meteorologicalService Department
	Ms. Malika Nazarova	Deputy Head of service on monitoring of atmosphere air, surface waters and soils pollution
State Committee for Nature Protection Ecological Movement of Uzbekistan	Ms. Lyudmila Aksenova	Head of Department on International Cooperation and Programmes
	Ms. Nadezhda Dotsenko	Senior Specialist of main administrative agency on protection of atmospheric air
Ministry of Economy	Mr. Bahriddin Muradov	Senior Specialist
Ministry of Agriculture and Water Resources	Mr. Zokhid Salikhov	Deputy Head of International Relations Department
	Mr. H. Mamarasulov	Deputy Head of department of coordination and development of market infrastructure on village
	Mr. M.Kosimov	Deputy head of the complex of economic reform
Goskomgeodezkadastr	Mr. T. Abdulaev	1st Deputy Chairman
	Ms. T Rizaeva	Expert on creation and conducting of CSSC
	Mr. K. Magdiev	Chief Engineer
Ministry of Finance	Mr. T. Mirzaev	Chief of Department
Health Ministry	Mr. S. Shoumarov	Director of the Research Institute of Hygiena, Sanitation and Occupational Diseases
UN Joint Programmein Karakalpakstan	Mr. Sh.Akbarov	Programme manager
Institute of WaterProblems (IWP)	Mr. E. Makhmudov	Director of Institute
International Water Management Institute, Central Asia Office	Mr. AkmalKarimov	Regional Researcher
	Mr. M. Yakubov M.	Senior Researcher Officer
	Mr. Jumaboev K.	Research Officer
ADB	Ms. DewiUtami	Chief Specialist
WB	Mr. D.Khidiriv	Senior Rural Developmant Specialist
CER	Mr. Bakhadur Eshonov	Director
	Mr. Talat Shadybaev	Research Coordinator
	Mr. B. Ergashev	Research Coordinator
ELS	Mr. K.Babadjanov	Project Manager
	Mr. E.Valli	Programme Coordinator
GIZ	Mr.Ralf Peveling	Country Director
	Mr. P. Pirniyazov	Adviser
Ministry of External Economic Relations, Investments and Trade of Republic Uzbekistan	Mr. Bakhodir Alikhanov	Chief of department
	Mr. Oybek Shagazatov	Chief Specialist of department on account and monitoring of projects
GIZ, Transboundary	Mr. I. Abdullaev	Regional Advisor

Water Management in Central AsiaProgramme		
GEF SGP	Mr. AlexeyVolkov	Programme Coordinator
	Mr. Djavlan Maksumov	Procurement assistant
Project UNDP "Strengthening Disaster Risk Management Capacities in Uzbekistan"	Mr. Abdumalik Sidikov	Project Manager
Project UNDP "Achieving Ecosystem Stability on degraded land in Karakalpakstan and the KyzylkumDesert"	Mr. Umid Nazarkulov	Project Manager
Project UNDP "Integrated Water Management and Water Efficiency Plan for Zarafshan River Basin"	Mr. Ulugbek Islamov	Project Manager
Debriefing meeting in UNDP	Mr. Jaco Cilliers	UNDP DRR, UNDP Uzbekistan
	Mr. Abduvakkos Abdurahmanov	Head of EEU, CO, UNDP Uzbekistan
	Ms. RanoBaykhanova	Climate Change Specialist, EEU, UNDP Uzbekistan
Ministers Council of Karakalpakstan	Mr. Bakhodir Yangibaev	Chairman
Farmers Association of Karakalpakstan	Mr. Azat Tileumuratov	Chairman
Hydro Meteorological Department of Karakalpakstan	Mr. Aybosin Kdirniyazov	Chief

166. In addition to the stakeholders mentioned above, both Dekhkan agro-pastoralists and large-scale farmers have also been consulted during the field survey to Karakalpakstan to identify their willingness to participate in the project and provide additional inputs to the project strategy. 14 districts have been covered and 286 people, among them 93 women have been directly consulted through the community consultation workshops at the Khokim offices and Mahallas. Four field visits have been held where representatives of all 14 districts have been present. These districts were Muynak, Kegeyli, Takhtakupor, Chimbay, Kanlykol, Amudarya, Kundgrad, Nukis, Khodjeyli, Ellikkala, Karauzyak, Turtkul, Shumanay. The results of the consultations and data collected have underpinned the CVI analysis presented in the earlier section (table 3). These consultation and assessment also determined the geographic focus on the project in the four most vulnerable districts of Karakalpakistan. Some of the key findings of the consultations are summarized below:

- The local land users are not very aware of optimized use of water resources, cropping drought resistant and salt-tolerant crops in drought years.

- The primary interest of dekhkans and farmers of northern villages of Kegeyli district is in developing livestock and diary production rather than farming, as this is a comparative advantage of these districts. The water scarcity in these downstream villages often pose a range of difficulties in farming

- One of the main activities in developing livestock and diary production is to build a forage base by cropping alfalfa in order to provide the stability in drought years. Alfalfa is the most appropriate feed crop in case of Karakalpakstan due to its drought-resistant and salt-tolerance.

- The main reason for selecting the northern downstream districts as target zones for the project is the quantity and quality of water resources that they receive. These districts are less likely to be successful in agriculture, yet agriculture is the sole local source of income. In fact, many people resort to going to Kazakhstan and Russia to work from spring to autumn season.

- The consultations held with government officials on theSocial and Economic Development Program priorities indicates that the livestock production is critical in the driest zones and therefore collective production of forage crops is a major livelihood factor.

167. The project has taken the findings of the consultations fully into account in the design of the proposal. The most vulnerable dekhkan farmers and pastoralists have been identified as a result of these consultations, who are the majority of community members consulted. Women were included in all group discussions.

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

168. In terms of adaptive additionality, while some of the activities fall within the general remit of rural development, many of the investments which also have a specific adaptive value would not take place without the proposed project, given the socio-economic profile of the populations targeted and the fact that other parties have tended to focus on larger farmers (for example projects to strengthen the extension service which are fee based). These include the investments in the sunk cost of hydro-meteorological infrastructure and real time data relay and integration to facilitate a rapid adaptive response within the farming season, to the modelling of longer term trends in a climate change context on the basis of the higher quality data base which will be available. Similarly, while the horticultural greenhouses have an income benefit for farmers, it also helps 'insulate' them from the effects of decreasing average rainfall and the associated increase in the spatial and temporal variability as well as erosive intensity of that rainfall.

Component 1: Institutional and technical capacity for drought management and early warning developed

Baseline:

169. Memories of devastating droughts of 2000/01 and 2008/09 are still very strong. One of the reasons of such overwhelming losses was the failure to prevent the scale of damage through adequate preparedness, prognosis and planning for contingency response. Yet until now Uzbekistan has not established a systematic drought early warning system including measures to reduce drought risk, in spite of the potential for establishing such a system in the Republic. Without project funding the capacity of government to better manage natural resources in light of scenarios of climate change impacts to be modeled will remain under its potential.

170. The Hydro-MeteorologicalCentre (Uzhydromet) has considerable potential with respect to weather forecasting and climate modeling, and hence as a critical resource for applied weather information management as well as planning for climate change: it has both a strong institutional capacity and political status. With 1,836 permanent staff and a $5.6 m annual budget, Uzhydromet provides a full coverage throughout the country and as such can leverage the pilot weather forecasting and climate modeling for Karakalpakstan to other provinces. Nationally it has 78 meteorological stations, 19 hydrological stations with 129 hydrological gauging stations, 15 aviation meteorological stations, 61 agrometeorological stations and 30 agrometeorological gauging stations. However, for a comprehensive and well-functioning drought early warning system new technical skills, hardware and institutional coordination and feedback mechanisms are necessary. Under the baseline scenario

this functionality is unlikely to be achieved due to high demand for current services throughout the country. Furthermore, the density of meteorological and hydrological stations is insufficient under the baseline to provide adequate coverage for drought monitoring, especially in arid areas such as the project site, with high temporal and spatial variability of rainfall. Although it is believed that this variability is and will continue to be influenced by a climate change induced aridification across the province, better resolution data is required to confirm and continue to monitor these trends.

171. A wide range of data are necessary to adequately monitor climate and water supply status (i.e., precipitation, temperature, streamflow, ground water and reservoir levels, soil moisture, snow pack). These data are often not available at the density required for accurate assessments of the implication on farm level water availability, a critical and unlikely to be achieved under the baseline scenario. With climate change, seasonal forecasts and warning systems would also need to be linked with water user and farmer groups as well as extension services for the warnings to be effectively and timely delivered. Currently this potential has not been realized.As a result, it is difficult for the government to efficiently direct water resource management, implying that the dramatic trends in water over-abstraction and inefficient usage projected in the SNC is less likely to be mitigated, with the resultant economic, social and environmental consequences. This is particularly important in Uzbekistan in light of the fact that does not have control of most of the source areas of its water.

172. The role of the extension service becomes critically important in the context of climate change adaptation, but Uzbekistan does not yet have a robust extension system in place apart from the existence of a few relevant institutionswho provide some outreach. There are few other centres established through donor support but without clear institutional affiliations or long term, well secured funding sources. Some commercial structures are also emerging with support of the World Bank, but largely orientating towards large, private farms; under the baseline this will continue to leave most of the vulnerable small holder farmer and pastoral communities out of reach of adaptive knowledge, practices and technologies, resulting in increasing negative impacts both for households, more generally socially as well as in terms of environmental rehabilitation opportunities foregone. Linking drought warnings with extension serviceswhich are well embedded into the endogenous institutional structures, such as scientific and research institutes, farmers and water user associations and linked with Makhalla village councils is the opportunity for adaptation oriented extensions and farmer advisories would be the ideal, but currently there is no catalyst for such integration.

Adaptation Alternative:

173. Adaptation cost of this component entails improvement of coverage by hydrological and agrometeoroligical gauging stations, as greater density is required for an effective drought early warning system; the Achilles heel of early warning systems is typically their perceived lack of practical value by would-be users, which in turn is typically related to resolution of the data as well as timeliness of the messages. The potential of Uzhydroment as a national institution with coverage also in the project area will be realized under the with-project adaptation alternative scenario for this component. Practically, the project help improve weather and climate data generation and management. This will be critical in benefiting both (a) planning capacity of government and (b) optimizing farm level decision making. Together this will significantly contribute to the adaptive capacity of the province.

174. As mentioned, the information products produced by early warning systems often are not user friendly. Many products are too complicated and do not provide the type of information needed by users for making decisions. Furthermore, users are seldom trained on how to apply this information in the decision-making process or consulted before product development. Many products are not evaluated for their utility in decision making. Information on run-off formation, water levels in reservoirs and groundwater levels, moisture content in soil in the main agricultural provinces and snow packs are necessary data sets that will be required for drought prediction and long term observation of climate change driven aridification processes at the level of government planning bodies. However meteorological and hydrological data often are not widely shared

between agencies of government. This restricts early assessment of drought and other climate conditions and retards its use in drought preparedness, mitigation, and response. Furthermore, the high cost of data acquisition from meteorological services restricts the flow of information for timely assessments and for use in research. Memoranda of Understanding (MOUs) between government agencies would facilitate data sharing and use and could bring multiple benefits.

175. Under the with-project scenario, the improvement of institutional mechanisms - including coordination for channeling climate information, delivering drought forecasts and early warning products that are well tailored to the key users - will result. In turn, so will the underlying capacity for climate change informed and credibility for evidence based policy making. This will significantly contribute to the effectiveness of line ministries from the perspective of leveraging their sector specific knowledge towards a province wide approach to climate change, and in doing so possibly represent a model for national scale replication. At either scale under this scenario there will be an improvement in the efficiency outcomes of water related decisions, resulting in higher incomes and reduced impacts from increasingly frequent droughts at farm level and their knock-on effects through the economy in general, with thesocial impacts this entails.

176. The province under the with-project scenario will be enabled through improved climate data acquisition, analysis and dissemination capacity to develop evidence-based and climate change aware water contingency plan, in the process avoiding or at least reducing what would otherwise be dramatic losses in the sector of agriculture such as in the 2000-2001 and 2008-2009 drought periods. Training packages on how to interpret and apply climate information will have been developed and delivered for all levels of institutional hierarchy through Component 1 of the project (from the national ministries to the local organizations that will host extension services). User needs will have been assessed and products evaluated through permanent feedback mechanisms. Such mechanisms include extension office-facilitated Climate Field Schools that can even be mobile to cover groups of villages and acquire feedback for better tailored climate risk and response information. This will help mitigate the impacts on the province of the fact that the country does not as yet have a well institutionalized extension system; at least Karakalpakstan will have established an adaptation oriented extension capacity on a pilot basis and will be in the position to evaluate its effectiveness in considering recurrent funding and upscaling its capacities.

177. The project area will be benefiting from a more advanced approach to extension; science based advice benefiting from the latest understanding of the adaptive value of various possible practices and technologies, supporting actors engaged in agricultural production by facilitating their efforts to solve climate related problems. Climate risk management and adaptation solutions will be embedded under this scenario as part of the service package already provided by research institutes, government organisations and relevant associations (e.g. farmers associations). Project will have seen the benefits of this approach and will be financing the development of institutional capacities for extension service and concrete products which help farmers prepare for greater climate variability and uncertainty, create contingency measures to deal with exponentially increasing risk, and alleviate the consequences of climate change by providing advice on how to deal with droughts (for example, through a suite of water conservation, agronomic techniques, drought and salt resistant varieties etc). As a result, farm income and land condition will suffer less in the face of future climate shocks.

Component 2: Climate resilient farming practices established on subsistence dekhkan farms of Karakalpakstan

Baseline:

178. Water is the most limiting factor in the arid lands of Uzbekistan; in particular the regions that are located downstream such as the project area. Fears of scarcity under the business-as-usual, without project scenario continue to drive in over-irrigation by upstream farmers, leaving very limited amounts of water for the

downstream farmer and pastoral communities. This over-irrigation continues, ironically, to decrease crop production through secondary salinisation. Furthermore, under the baseline, the over reliance on the central irrigation system and irrigation in general continues to divert attention away from water and soil conservation measures which could otherwise offer greater land and water productivity as well as greater resilience to droughts. The government is becoming increasingly aware of pressures posed by drought and climate change induced reductions in water flows and in response to severe droughts of 2008/09 the government has issued the policy measures to help minimise the losses (such as fodder production, establishment of greenhouses etc). Since 2002 it has invested $1,000,000,000[19] in agricultural modernisation, land consolidation and upgrading of infrastructure. For the water management sector this includes rehabilitation of pump stations, canal, drainage system and procurement of machinery for land reclamation Examples of these types of macro scale expenditures are provided below.

Table 12. Sample land productivity investments over the medium term, current and projected

Category	Legal base	Budget
Ministerial / sectoral	Regulation of the President of the Republic Uzbekistan 27.12.2011, No.PP-1668 On the Investment Program of the Republic of Uzbekistan, implemented by the Ministry of Agriculture and Water Resources for the per of 2005-2015	413.49 million (largely financed by international financing institutions such as the World Bank, IDA, ADB, OPEC etc, which will have to be repaid, albe in some cases on a concessional basis)
Special fund	Regulation of the President of the Republic Uzbekistan 19.03.2008, No. PP-817, "On the National Program of Land Reclamation Irrigated lands for the period of 2008-2012"	$396 million

179. Yet under the baseline this essentially only benefits the private, commercial farms which replaced inefficient shirkats after the two phase reform since 2003 and more recently since 2008, with the new 'land optimisation" policy. The reform processes under this scenario continues to be slow, providing little political impetus towards the adaptation solutions required at farm level, in particular for the dehkhan subsistence farmers, who continue to suffer in the face of constrained livelihood options, the legacy of an irrigation culture, lack of awareness of other options, concentration of risk in a few crops and related social impacts.

Adaptation Alternative:

180. Uzbekistan is a both a water stressed and water insecure country, given that 90% of its surface water originates outside of its political borders cannot continue to overly rely on solely on supply driven, irrigation solutions. Under the with-project alternative, evidence-based advocacy and ongoing relationships built through the project, which will have started with the consultative process undergirding the project design, will have influenced thinking towards demand-based water management. Practices will increasingly under this scenario become common in the project area and beyond, practices which entails greater emphasis on water conservation, moisture retention in soil through agronomic choices, minimisation of the exposure of bare ground to wind and water erosion and of evapotranspiration rates which are all potentially increasing due to climate change. The project through Component 2 will have financed concrete adaptation measures on a variety of farms and pasture lands (of different sizes and in a range of locations, for maximum representativeness and exposure), with the full engagement of local communities and authorities, who have seen the benefits in the short term. Although motivated mostly by farm-level financial benefits, repeated exposure of project

19 Source: The Ministry of Agriculture and Water Resources (2012)

participants to messages about adaptation are starting to change thinking, mirroring changes which are taking place in government.

181. The project will have extend its support to over 40,000 farmers (mainly Dekhkan farmers that are engaged in both farming and pastoral activities) and will have covered 20,000 ha of land with farm-based climate resilient measures that will improve overall productivity, especially in dealing with climate change related risks. Given the impressive scale and demonstrable results at many of the sites, interest has been generated on the part of the media, who has been regularly briefed and is proving to be instrumental to gaining the involvement of officials and others from outside the project area. In this way replication is starting to occur, resulting in a positive broad cost-benefit calculation ex project and assuring sustainability. Furthermore, a regulatory framework, including policy and financial mechanisms (e.g. utilisation of Makhalla fund and other state level and communal mechanisms) has been developed and established in order to support good practices of conservation agriculture and climate resilient farming and pastoral practices. All of this has resulted in reduced losses during the next major drought, recognition of which has proven to be the main impetus for more widespread take up of the adaptation oriented approach, with multiple benefits.

182. In terms of agricultural and pastoral production systems, with a view to preparing farmers for a drier future, the following concrete adaptive practices will have been promoted and eventually adopted over the realistic seven timeframe allowed for the activities: adoption by Dehkhan farmers of climate resilient conservation agricultural practices (representing output 2.1.); adoption of water saving irrigation practice in-field (output 2.2); and establishment of horticultural greenhouses using drip irrigation (output 2.3). In addition, a number of activities have focussed on livestock production as well as range management, which are inherently adaptive in terms of the increased risk of drought, assuming the right type of livestock are utilized, which have been tested and documented through the project. Livestock screening and promotion of the most suitable types of animals which also have a local market will be undertaken through the project under the more general category of inventorying adaptive agronomic practices. As a result farmers and pastoralists are more aware of the environmental impacts of certain livestock management practices and are starting to change behaviour, particularly given the incentive of improved security of tenure, which makes investment in management intensity as well as interventions such as reseeding more attractive. The demonstration effects of 'lead' pastoralists, who are improving the health of their animals and benefiting from a higher yield of milk and meat, as well as having a 'fatter' investment reserve in the case of an unanticipated expense, is driving wider adoption, with benefits starting to appear at landscape scale.

Component 3: Landscape level adaptation measures for soil conservation and moisture retention improves climate resilience of 1,042,094ha of land

Baseline:

183. The baseline situation is one of sporadic and largely unsuccessful attempts to stabilise sands and prevent their detrimental encroachment to the farm and pasture lands. With climate change induced aridification and change in intensity, the direction and speed of the winds, sand movement will be augmented and productivity of farm lands further undermined. This continues to activate the salt migration processes under the without project scenario in the area concerned. The main reasons for failed attempts to encourage larger scale rehabilitation of vegetation cover and maintenance of plantations (which could mitigate these effects) - the ad-hoc nature of such efforts and the failure to link them with a broader view of landscape functions as well as poorly planned coverage which has not achieve their potentialutilityas windbreaks or sand fixing barriers – continues to reinforce the Malthusian narrative of hopelessness. Sporadic efforts continue but are not planned and implemented based on climate change scenarios and wind models as they lack the analytical and computation capacity to take this into account. As a result, as winds shift the plantations prove to have been very cost ineffective and in any case are not sustainable due to the lack of community consultation or sense of ownership. In spite of posting guards, illegal harvesting of trees continues to undermine the viability of these

systems, creating critical gaps in the wind barrier, resulting in turn in a wind fetch which allows attainment of a critical velocity to move sand. Farms in the area continue to be abandoned; the households migrate to local urban centres but have few skills which are employable, resulting in social issues.

Adaptation Alternative:

184. Saksaul and tamarix, indigenous plant species that have sand-binding qualities, are drought resistant and salt tolerant have been widely planted in the project area under the with-project adaptation alternative. The project under this scenario has financed through a mixed model with community institutions and government at different levels, including through soft loans, plantations on large farmlands and adjacent areas of Dekhkan farms and pastures so that the ownership and maintenance have been duly secured. This proves to have had an important effect in terms of maintenance, especially as the proximity also facilitates regular harvesting of fodder. During the last drought the contrast between the welfare of households who had access to this resource and those who did not, in terms of livestock mortality, health and market price, did not go unnoticed and communities from outside the project area have petitioned the project to implement these activities in these areas. The project has directed them to government counterparts who have been involved and now have the capacity to help replicate the technical-institutional model, with variations to take into account local bio-physical and socio-economic conditions. Resilience to climate change has been improved through correct siting, based in turn on the incorporation of climate change scenarios and models generating wind power alternations in directions and velocity on the basis of various scenarios with respective probabilities over a range of timeframes. This new approach to project planning has generated interest, and is starting to be taken up; in fact it is the first comprehensive adaptation project in the country and as such is gaining good exposure, maximizing the likelihood of replication through other funding sources.

185. The project under this scenario has successfully support an integrated landscape planning for Karakalpakstan, which in turn informs in a more systematic way sand fixation works and installment of windbreak buffers, including beyond project sites, which nevertheless represent a useful sample across a range of agro-ecological zones and locations in the landscape. The project has also assisted Khokimiyat and Makhalla governance structures to mobilize farming and pastoral communities through the employment programmes to involve in landscape level planning, establishment of such plantations and their maintenance. This rare opportunity to supplement income at household level has been appreciated and has also resulted in new skill sets which people are starting to apply on the edges of their own land, evidence of new thinking. Some 75,000 community members have been sequentially employed across the various locations over the project lifespan and the target of some one million hectares covered looks likely to be achieved due to the combination of on farm afforestation by land users and government support on state land, together with interest from other projects and communities. The resulting rejuvenated vegetation cover can already be seen to have water flux benefits, reducing runoff during the increasingly intense rain events which are being attributed by the media to climate change. The improved rangeland conditions are benefiting pastoralists, and with a new landscape management arrangement and regulations in place, over grazing has been reduced.

186. The saksaul and tamarix plantations started out having been established on only 70,000 ha of the target 1,000,000 ha directly by the project, in 4 target zones identified by a combination of participatory planning and simulation modelling in conjunction with centres of excellence with this capacity in Karakalpakstan. Data from other projects in the country indicates that the cost per ha of planting saksaul and tamarixwill be approximately 30 USD. Given the multiple and significant benefits of saksaul and tamarix plantations (many studies and practical application in Uzbekistan or elsewhere demonstrated that there is a direct correlation between soil moisture and windbreak and sand fixation shrubs and forests; for example biomass per unit area under windbreak and sand-fixation forests is higher than in windward slopes or wind exposed plains) this activity is widely considered to be cost effective and hence is being replicated. The cost effectiveness numbers gathered over the course of the project are helping to make the case. Monitoring by the project has demonstrated that wind erosion in uncovered sandy soils is as much as 80-% greater than in vegetation covered lands. This

combination of technical and financial evidence has been compiled through the projects knowledge management component, which will be institutionalized through hosting in a center of excellence in the province, which also encourages a sense of ownership and represents a baseline and good methodological standards to be followed in future related applied research by masters and PhD students.

187. In fact the windbreaks and sand fixing shrubs have been found through project monitoring to have improved not only the soil structure but even to create more conducive micro-climate (e.g. higher level of humidity) that is propitious to the recovery of vegetation and helps mitigate the effects of drought and aridification in the broader environment. Of most importance to project participants and the neighbours to project sites, however, these plantations have considerably increased land productivity of farm and pasture land, providing a sustainable basis for development of livestock and diary production by the most vulnerable communities in drought years.As these welfare benefits are becoming more well-known, the approach is also garnering more support.

Component 4: Knowledge of climate resilient agricultural and pastoral production systems in arid lands generated and widely available

Baseline:

188. While the government and rural communities arewell aware of increasing variability which is negatively affecting agricultural production and people's livelihoods, under the baseline without-project scenario there is little awareness and knowledge how to move towards climate resilient solutions. This in fact is an underlying cause of the current situation; despite some sporadically demonstrated water saving irrigation and agronomic methods, take up rates are very low and the farmers continue the same inefficient and unsustainable practices that increase their vulnerability to drought and climate change risks. Ironically, good practices have been demonstrated, but not at a scale that makes the justification for broader application readily apparent, in spite of promises by the proponents that they are indeed scalable and would have a higher efficiency were a critical scale under adaptive practices were to be achieved. Unfortunately outreach mechanisms and transmission of knowledge under the baseline continue to be limited in scope, not well tailored or systematic.Moreover, any lessons learned are not being captured in a fashion that facilitates broader sharing, or that casts light on ways to address an aggravation of the food security situation during the droughts and as a result of climate change. All of which has meant that there has been little turning of the many scientific and other trials into activities which have had any evident effect on the increasingly frequent and more severe droughts, as well as flooding due to greater intensity of rainfall, higher temperatures and the declining vegetation cover; an ecosystem trapped in a negative feedback loop, exacerbated by uncoordinated resource use approximating an open access regime for both water and biomass resources.

Adaptation Alternative:

189. Under the alternative, with-adaptation-project scenario, strong knowledge, awareness raising and advocacy measures have definitely been an influence to promote climate resilient farming and pastoral practices among the rural population, as well as influence key sectorial and local development policies of Karakalpakstan. The project has established close partnerships with centres of excellence such as KhorezmUniversity, the Bioecology Institute of the Karakalpak Branch of the Academy of Sciences, which has helped institutionalize and systematize knowledge management. In fact this process has included from the beginning an important feedback loop to key government institutions and decision-makers. This has benefited the project mission to date and there is good reason to believe that the knowledge documented and the dissemination system established through the project will be leveraged by future projects and by the government itself. Although indirect in its effects, it is reasonable to infer that the improvement in extension advice and the benefits from this evidence-based and adaptation aware approach is due at least in part to the knowledge management component of the project.

190. In short, from an adaptation perspective, the improved weather monitoring and climate modeling capacity, together with a more effective early warning system, will put this most vulnerable region of Uzbekistan on a more solid footing in terms of identifying the local effects of climate change and taking these into account in land management decisions at various levels. This capacity will be reinforced by awareness of more adaptive crop and livestock options and demonstration of their effectiveness. A wide range of water efficient agronomic practices and locally adapted technologies will be implemented, improving income levels and livelihood diversification, all of which improves resilience at the household level. For example, horticultural greenhouses will both reduce the impact of droughts by creating a managed micro-climate as well as extend the growing season, significantly enhancing net revenue. This will be complemented by enhancing the resilience of the ecosystem within which agriculture and livestock keeping takes place, with benefits such as increased soil depth, leading to better water flux management, as well as through reduction in environmental 'pollution' in the form of the deposition of windblown sand on fields and pastureland.

191. Just as importantly, the capacity to model climate change impacts and take them into account in planning, as well as improved understanding at field level through an extension service strengthened by delivery of a proven farmer climate field school curricula, will increase the adaptive capacity of the region to identify and implement climate change solutions in the future and, the process, inspire similar activities elsewhere in the country. All of this responds a number of key barriers identified in Uzbekistan's Second National Climate Change Communication, but in particular the barrier of lack of applied research and development which connects climate change impact assessment with other environmental and socio-economic challenges.

192. Finally, the proposal is fully in line with the Adaptation Fund's portfolio level Objective 1, 'to reduce vulnerability to the adverse effects of climate change, including variability at local and national levels.

J. Describe how the sustainability of the project/programme outcomes has been taken into account when designing the project.

193. Sustainability considerations have been built into each component of the design of the project, as well as into the overall approach. The cost effectiveness of the project is also partly a function of sustainability, and investments are expected to pay off both over the life of the project as well as beyond. To that end capacity building is an element in each component.

194. Improvement of the hydro-meteorological monitoring system, a key element towards achieving outcome 1, should be undertaken on the basis of existing infrastructure operated by governmental entities such as Uzhydromet, in order to ensure its operational status in the post project period. Eight meteorological stations are proposed to be modernized and 2 existing water gauge stations in critical locations for monitoring water levels will be equipped with Doppler advanced water flow meters/sensors. This upgrading of the knowledge acquisition and monitoring system which forms the technical basis of an early warning system of both droughts as hydrological phenomenon but also as telltale signs of a possible trend towards aridification requires a robust communication system to provide continuous data exchange between the mangers of the systems and users of technical information (ministries, other projects) and weather/climate vulnerable target groups. Hence advanced transceivers that support all locally available communications (radio, mobile, satellite) will be installed to relay information within a timeframe which is of practical use for farm level management decision making.

195. The hydro-meteorological monitoring modernization will contribute to the both hydrometeorologial and climate change services and the development of a drought early warning system which will be institutionalized in Karakapakstan. Furthermore, an upgraded hydro-meteorological local system will be integrated with an existing and functional state system (the Uzhydromet communication system), which will be serve a wider

spectrum of end users and help ensure that appropriate knowledge and information is quickly dissemination from dehkhan (local) to policy makers.

196. This physical infrastructure, together with capacity building for the use of the equipment and interpretation of the data will be complemented through a Climate Field School network to be established in the project area and will promote public awareness of the value of weather information and of climate trends in ways which are meaningful to local land users. In short, the integration of an upgraded hydro-meteorological monitoring system, reinforced with a robust communication system and the socio-economic dimension in the form of a Climate Field Schools network will quickly evolve the early warning system, which can otherwise remain trapped in a loop of information circulation between only scientific users.

197. The sustainability of this first set of activities will be ensured through integration from the beginning with recurrently governmentally funded institutions such as Uzhydromet, MAWR, local administration, Farmers Associations, etc.

198. Turning now to the second outcome, and a critical element toward the overall objective of the project, the establishment of climate resilient farming practices on subsistence dekhkan farms of Karakalpakstan will have the effect of strengthening adaptive capacity at household and community level to support sustainable livelihoods, through both livelihood modification as well as diversification. These elements will be promoted will be specifically selected for their combination of sound agronomic practice irrespective of climate change, their adaptive benefits and their income generating potential, amongst other considerations. The actual practices will be identified through a consultative process and will also benefit from a review of current practices in the country and region as well as good practice internationally.

199. Adoption of conservation agriculture practices by target farms, such as low till, mixed cropping, fodder production, and residue crop soil covering will be promoted; together with adoption of water saving irrigation practices to improve farm-level drainage and minimise salinisation; and finally establishment of horticulture greenhouses on farms to minimise the impacts of droughts on farm production. All of this will be undergrid by a process (both through a literature review and participatory field testing) of identification of the most suitable crops for cultivation under a scenario of aridification, and associated practise. Similar activities will focus on livestock production (especially dairy).

200. The adoption of water saving irrigation practices will mitigate the current challenge of salinisation, which would otherwise would become worse as the evapo-transpirative demand increases with increased temperatures and increased windspeeds due to loss of vegetation in the surrounding off farm landscape; while establishment of horticulture greenhouses by farmers who could not previously afford them will increase crop productivity even under a scenario of declining average rainfall, thus ensuring livelihoods for targeted local farms.

201. Importantly, the sustainability of these activities will be ensured through project facilitation of a legal and regulatory framework which is effective to support well tested farm-based adaptation measures for replication and upscale. Ideally recurrent budget allocations can be influenced on the basis of evidence based policy making, with new policy options presented through the scientific and participatory approach taken to the identification and testing, as well as monitoring of on farm and related off farm activities. In addition to legal framework, a likely impact of actual on-farm demonstrations of adaptation measures will stimulate further uptake of the successful adaptation practicies. Proposed adaptation measures (e.g. conservation agriculture, improved irrigation and drainage, fodder production etc) will bring greater productivity and drought preparedness capacities. Probability of target farmers and pastoralists taking up these measures and others replicating is high.

202. In terms of the off farm context, the project includes with respect to outcome 3 landscape level adaptation measures for soil conservation and moisture retention which improves climate resilience of over 1,000,000 ha of land. This ambitious target will be achieved through coordinated efforts of farmers and pastoralists on their land and by the government on state land within which patches of farming is practiced. It is also anticipated that successful pilots of the landscape level plantation element will be replicated and upscaled by other projects, by the government and by the communities themselves.

203. Landscape level integrated planning for land use and landscape rehabilitation is a necessary, region-wide measure to improve drought management and long term adaptation to greater arid conditions. In order for sand stabilization and landscape rehabilitation to sustain in long term, including in the conditions of increased aridity and intensified drought and wind occurrences in these arid lands, scenario based land rehabilitation plan has to be developed. The project will initiate the implementation of this strategy and long term plan by commencing the plantation of saksaul and tamarix to deliver sand stabilisation and soil desalinisation functions.

204. The locations and aspect of the plantations will be based on wind models within the context of a comprehensive landscape rehabilitation and management plan, which in turn will be modified over the course of the project and will be based in part on community input, in part on an ecosystem assessment under current conditions and in part with respect to scenarios of climate change impacts.

205. The benefits of saksaul and tamarix plantations are enormous and have proven to be successful in other parts of Central Asia and elsewhere. Plantations for sand stabilization will protect both farms and pastures from being buried under the desert sands, protect these productive lands from wind erosion, while ensuring soil moisture retention. These plantations as a result will considerably increase land productivity of adjacent farm and pasture lands. Furthermore, sand fixation plantations are expected to bring economic benefits, being used as fodder by pastorals during drought. The planting itself will provide temporary additional income to some 75,000 local land users, as well as represent a capacity building and awareness raising opportunity.

206. A community management scheme for planting and maintenance will be developed early in the project, both as a community employment scheme as well as to practically achieve landscape level adaptation. The communities in the area will also benefit from the services and products of the enhances ecosystem, in a direct form through, for example, harvesting of fodder, and indirectly through, for example, reduction of blown sand events. Finally, the establishment of ccooperative management institutions for landscape rehabilitation and management will enhance community control and ownership arrangement.

207. The generation and wide availability of knowledge of climate resilient agricultural and pastoral production systems in arid lands represents the knowledge management component and outcome 4 of this proposal.

208. While the government and rural communities are very well aware of increasing variability that is negatively affecting agricultural production and people's livelihoods, there is little awareness and knowledge how to move towards climate resilient solutions. This is an underlying cause of the current situation when despite some sporadically demonstrated water saving irrigation and agronomic methods take up rates are very low and the farmers continue the same inefficient and unsustainable practices that increase their vulnerability to drought and climate change risks. However outreach mechanism, transmission of knowledge is limited in scope, not well tailored or systematic. Moreover, any lessons learned are not being captured in a fashion that facilitates broader sharing, or that casts light on ways to address an aggravation of the food security situation during the droughts and as a result of climate change.

209. The project will fund the knowledge, awareness raising and advocacy measures that will help promote climate resilient farming and pastoral practices in the arid lands among the rural population, as well as influence key sectorial and local development policies of Karakalpakstan. The project, in close partnership with

respective local universities, institutes and others, will institutionalize a systematic knowledge management system that will include feedback loop to key government institutions and decision-makers.

210. To this end, the project will organize regular field-based demonstration meetings for targeted advocacy and replications. Such meetings will be organized on the project demonstration farms with participation of local authorities, other farmers, national government representatives and media. Demonstrations of concrete farming and pasture management methods that provide evidence of bringing benefits of greater food security and resilience to droughts will trigger the replication and hence contribute to the cost effectiveness of the investments as well as their sustainability.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project / programme implementation.

211. The project will be implemented through the National Implementation Modality (NIM), as described in the UNDP Programme and Operations Policies and Procedures (POPP). At the national level, the project will be executed by the Center of Hydro-meteorological Service under the Cabinet of Ministers of the Republic of Uzbekistan (Uzhydromet) as the National Implementing Partner. The same organization through its branch office at the level of the targeted province of Karakalpakistan will execute all sub-national activities. The Hydromet will have the technical and administrative responsibility for applying AF inputs in order to reach the expected Outcomes/Outputs as defined in this project document. The Hydroment will be responsible for the timely delivery of project inputs and outputs, and in this context, for the coordination of all other responsible parties, including other government agencies, regional and local government authorities.

212. Upon the request of the GoU, UNDP will serve as the Multilateral Implementing Entity for this project. Services that UNDP will provide to the Implementing Partner in support of achieving project Outcomes/Outputs are outlined in Annex A. UNDP's services will be provided by staff in the UNDP Country Office (Tashkent), UNDP Regional Centre for Europe and CIS (Bratislava, Slovak Republic), and UNDP Headquarters (New York).

213. UNDP will provide support to the project manager in order to maximize its reach and impact as well as for the delivery of quality products. Moreover, it will be responsible for administering resources in accordance with the specific objectives defined in the Project Document, and in keeping with its key principles of transparency, competitiveness, efficiency, and economy. The financial management and accountability for the resources allocated, as well as other activities related to the execution of project activities, will be undertaken under the supervision of the UNDP Country Office (UNDP CO) with the UNDP's Regional Technical Advisor in Bratislava. UNDP will undertake the internal monitoring of the project and of evaluation activities, taking into account from the outset local capacities for administering the project, capacity limitations and requirements, as well as the effectiveness and efficiency of communications between all institutions that are relevant to the project.

214. UNDP would be fully accountable for the effective implementation of this project. 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 project staff and consultants; general oversight and monitoring, including participation in project 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.

215. As outlined in UNDP's application to the AF Board for accreditation as a Multilateral Implementing Entity, UNDP employs a number of project execution modalities determined on country demand, the specificities of an intervention, and a country context. Under the NIM proposed for the project, UNDP selects a government entity as the Executing Entity based on relevant capacity assessments performed by UNDP. The Executing Entity is the agency 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 project work plans and annual audit plans; preparation and operation of project budgets and budget revisions; disbursement and administration of funds; recruitment of national and international consultants and project personnel; financial and progress reporting; and monitoring and evaluation. However, as stated above, UNDP retains ultimate accountability for the effective implementation of the project.

216. The main office of the project will be based in Tashkent to enable all relevant procedures of UNDP. UNDP in partnership with the National Partner Implementing Agency (Uzhydromet) will be responsible for the competitive recruitment of national experts in accordance with the UNDP's Programme and Operations Policies and Procedures (POPP). Uzhydromet will be fully and equally engaged in all relevant stages such as TOR development and approval, its wider advertising, participation of long-listing and short-listing selection and interview (if required by POPP), consideration of the gender mainstreaming issues, monitoring of the progress and assessment of deliverables produced.

217. The National Partner Implementing Agency (Uzhydromet) will undertake the Executive Role to ensure full government support of the project implementation, and also the Senior Beneficiary Role representing the interests of those who will ultimately benefit from the project.

218. UNDP will undertake the Senior Supplier Role to represent the interests of the parties concerned which provide funding for specific cost sharing projects and/or technical expertise to the project. The Senior Supplier's primary function will be to provide guidance regarding the technical feasibility of the project. This role will rest with UNDP Uzbekistan represented by the UNDP RR/DRR or designated official.

219. The procurement of goods and services and the recruitment of project personnel by the UNDP country office shall be in accordance with the UNDP regulations, rules, policies and procedures.

220. The relevant provisions of the Standard Basic Assistance Agreement (SBAA) between the Government of Uzbekistan and the UNDP, signed by Parties on 10th June 1993, including the provisions on liability and privileges and immunities, shall apply to the provision of such support services.

221. Overall guidance will be provided by the Project Board (PB). This will include representation by the Uzhydromet as the Executive and Senior Beneficiary and, UNDP as the Senior Supplier, but key national governmental and non-governmental agencies, appropriate local level representatives, representatives of local governments and self-government (makhallas and councils of citizens of villages), and independent third-parties such as international or national NGOs can attend the augmented PB meetings as observers as well. The PB will be balanced in terms of gender.

222. The Project Board will be responsible for making management decisions for the project, in particular when guidance is required by the Project Manager (PM). It will play a critical role in project monitoring and evaluations by assuring the quality of these processes and associated products, and by using evaluations for improving performance, accountability and learning. The Project Board will ensure that required resources are committed. It will also arbitrate on any conflicts within the project and negotiate solutions to any problems with external bodies. In case a consensus cannot be reached, final decision shall rest with the UNDP. Project reviews

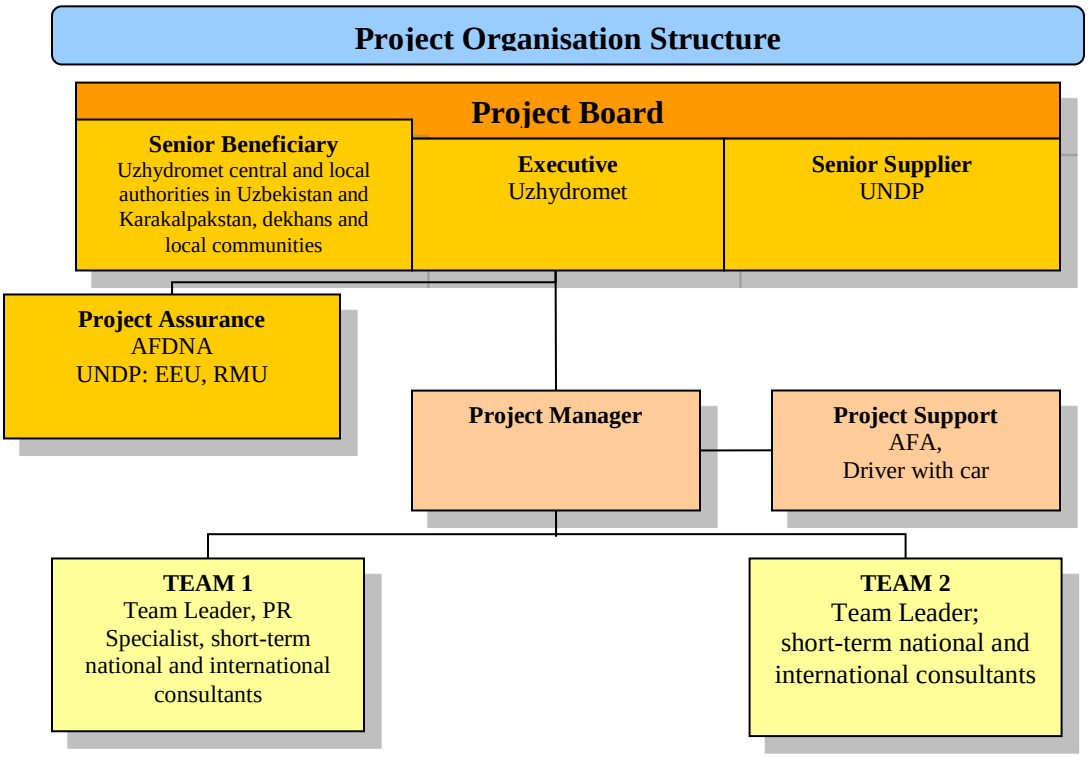
by PB are made at designated decision points during the running of a project (at least once a year), or as necessary when raised by the PM. In addition, it will approve the appointment and responsibilities of the PM and any delegation of its Project Assurance responsibilities. Based on the approved Annual Work Plan, the Project Board can also consider and approve the annual plan and also approve any modifications of the original plans.

223. In order to ensure UNDP's ultimate accountability, Project Board decisions should be made in accordance to standards20 that shall ensure best value to money, fairness, integrity, transparency and effective international competition.

224. Potential members of the Project Board will be reviewed and recommended for approval during the Project Appraisal Committee (PAC) meeting. The Project Board will contain three distinct roles:

225. *Executive Role*: This individual will represent the project "owners" and will chair the group. It is expected that the Uzhydromet will appoint a senior official to this role who will ensure full government support of the project and serve as the National Project Coordinator (NPC)

226. Senior Supplier Role: This role requires the representation of the interests of the parties concerned which provide funding for specific cost sharing projects and/or technical expertise to the project. The Senior Supplier's primary function within the Board will be to provide guidance regarding the technical feasibility of the project. This role will rest with UNDP Uzbekistan represented by the UNDP RR/DRR or designated official.



[20] UNDP Financial Rules and Regulations: Chapter E, Regulation 16.05: a) The administration by executing entities or, under the harmonized operational modalities, implementing partners, of resources obtained from or through UNDP shall be carried out under their respective financial regulations, rules, practices and procedures only to the extent that they do not contravene the principles of the Financial Regulations and Rules of UNDP. b) Where the financial governance of an executing entity or, under the harmonized operational modalities, implementing partner, does not provide the required guidance to ensure best value for money, fairness, integrity, transparency, and effective international competition that of UNDP shall apply.

227. Senior Beneficiary Role: This role requires representing the interests of those who will ultimately benefit from the project. The Senior Beneficiary's primary function within the Board will be to ensure the realization of project results from the perspective of project beneficiaries. The principal project beneficiary is the Uzhydromet but other project stakeholders listed below will be duly involved and consulted during the strategic decision-making and monitoring process during the augmented Project Board meetings.

228. Ministry of Agriculture and Water Resources of the Republic of Uzbekistan, central and local authorities in the Republic of Karakalpakstan, self-government bodies such as makhallas and councils of citizens of villages, river basin authorities, local communities, academia, and Karakalpakstan University will benefit from project results through development of their capacity to participate in the decision-making and progress-monitoring processes. In addition, all stakeholders will be covered by the corresponding training, education, and outreach activities, and will also benefit from an improved environment at the central, regional and local levels. These stakeholders can also establish an Inter-Agency Coordination Committee to provide advisory services and strategic recommendations to the Project Board and can meet either on regular (e.g. annually or quarterly) or ad-hoc basis.

229. Project Assurance: The Project Assurance role supports the Project Board Executive by carrying out objective and independent project oversight and monitoring functions. The Project Assurance role at the country level will rest with UNDP Uzbekistan (Environmental and Energy Unit (EEU) supported (when needed) by the Resource Management Unit (RMU) of the UNDP CO Uzbekistan.

230. A Project Implementation Unit (PIU) will be established comprised of core staff including: the Project Manager, and Project Administrative and Financial Assistant. The PIU will assist the Uzhydromet in performing its role as the National Implementing Partner. The PM will be recruited in accordance with UNDP's regulations to manage actual implementation of the project and will be based in Tashkent. The PM will be responsible for overall project coordination and implementation, consolidation of work plans and project papers, preparation of quarterly progress reports, reporting to the project supervisory bodies, and supervising the work of the project experts and other project staff. The PM will also closely coordinate project activities with relevant government institutions and hold regular consultations with other project stakeholders and partners. Under the direct supervision of the PM, the Administrative Assistant will be responsible for administrative and financial issues, and will get support from the existing UNDP administration.

231. To achieve the project outputs and implement the project activities, the Project Manager will also be supported by national experts (from research institutes, relevant ministries, regional and local authorities, NGOs etc.) and international consultant(s) recruited by UNDP based on the approved Annual Plan on project activities. The PM will be responsible for the consultants' timely deliverables and their contributions to the overall project outputs.

232. The project outreach, awareness raising and results dissemination and replication activities will be under the responsibility of a part-time PR specialist supervised by the Project Manager.

233. The Uzhydromet will provide office premises for the project team as well as telephone communication lines, and the required expertise and services of their corresponding staff. Local transport to demo sites, support of their relevant subdivisions and staff, and ensuring required access to relevant units will also be covered. This is considered as in-kind contribution to the project implementation to be provided by the Government of Uzbekistan. The Ministry of Agriculture and Water Resources of the Republic of Uzbekistan, central and local authorities in the Republic of Karakalpakstan, self-government bodies such as makhallas and councils of citizens of villages, river basin authorities, academia, Urgench University and Karakalpakstan University, makhallas, councils of citizens of villages, female groups and other non-governmental organizations will contribute to the project by making their personnel/staff and expertise available as and when required, as well as by participating in relevant expert, seminars, workshops or management meetings and/or providing

meeting/teaching/storage venues/locales as and when required. Beyond workshops, seminars and sub-contractual arrangements for the provision of relevant technical expertise the local community groups at Makhala level and NGOs will be actively engaged during the project implementation through the makhala level village councils that have proven an effective and credible mechanism for consensus-based decisions. Through these councils the community groups and NGOs will be able to provide essential feedback and guidance to the project so that it delivers on committed results in a way that is best fitted to local circumstances and reach out the most vulnerable parts of Dekhkan farmer and pastoral communities. As during the project formulation NGOs will also play a prominent role during the project implementation, particularly in community consultation and mobilization process.

234. Use of institutional logos on project deliverables: In order to accord proper acknowledgement to AF for providing funding, an AF logo will appear on all relevant AF project publications, including, among others, project hardware purchased with AF funds. Any citation on publications regarding this project will also accord proper acknowledgment to AF.

235. Audit Arrangements: The Audit will be conducted in accordance with the established UNDP procedures set out in the Programming and Finance manuals by the legally recognized auditor.

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

Risk	Risk rating high, medium, low	Risk Mitigation Strategy
Reluctance of farmers or pastoralists to depart from over-irrigation and overutilization of inputs approach towards climate resilient conservation agriculture	**Low**	The project takes a step-by-step approach and identifies "lead" farmers who have proven to be open to experimentation and have already demonstrated innovation. Selected demonstration farmers will provide evidence of benefits derived from low input and high output conservation agriculture and water saving methods. This will inspire and motivate neighbouring farmers to adopt the same practices. Evidence of increased productivity and decreased losses during the dry seasons will be closely monitored and demonstrated.
Repeated drought	**High**	Whereas the repeated occurrence of drought is a serious probability, the project has been designed to help ensureresilience at household level thanks to water saving methods and implementation of conservation agriculture techniques and forage production etc.
Low level of cooperation between executing institutions	**Medium**	The project operates at multiple levels and therefore will requir leadership of the UzHydromet and the Ministry of Agriculture a Water Resources. Close cooperation will be assured through a h level Steering Committee jointly hosted by UzHydromet and MAWR.

C. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.Include break-down of how Implementing Entity's fees will be utilized in the supervision of the monitoring and evaluation function.

236. Project monitoring and evaluation (M&E) will be in accordance with established UNDP procedures and will be carried out by the Project team and the UNDP Country Office. The Results Framework will define execution indicators for project implementation as well as the respective means of verification. Monitoring and evaluating system for the project will be established based on these indicators and means of verification. It is

important to note that the Results Framework, together with the impact indicators and means of verification, will be fine-tuned during project formulation.

237. 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

238. 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.

239. UNDP risk log will be regularly updated in intervals of no less than every six months in which critical risks to the project have been identified. Quarterly Progress Reports will be prepared by the Project team and verified by the Project Board. Annual Project Reports will be prepared to monitor progress made since project start and in particular for the previous reporting period. These annual reports include, but are not limited to, reporting on the following:

- Progress made toward project objective and project outcomes - each with indicators, baseline data and end-of-project targets (cumulative);
- Project outputs delivered per project Outcome (annual);
- Lessons learned/good practices;
- Annual expenditure reports;
- Reporting on project risk management.

240. Government authorities, members of the project PSC, and UNDP staff will conduct regular field visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress.

241. In terms of financial monitoring, the project team will provide UNDP with certified periodic financial statements, and with an annual audit of the financial statements relating to the status of funds according to the established procedures set out in the Programming and Finance manuals. The Audit will be conducted in accordance with UNDP Financial Regulations and Rules and applicable audit policies on UNDP projects by a legally recognized auditor.

242. The project will undergo an independent Mid-Term External Review at the mid-point of project implementation, which will determine progress being made toward the achievement of outcomes and identify course correction if needed. It will focus on the effectiveness, efficiency, and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation, and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. A Final External

Evaluation will be conducted 3 months before project closure and will focus on the same issues as the Mid-Term Evaluation. The Final Evaluation will also look at the impact and sustainability of project results.

243. The budgeted M&E plan is as follows and the break-down of how Implementing Entity's fees will be utilized in the supervision of the M&E function is included in Annex 2.

Type of M&E activity	Responsible Parties	Budget USD	Time frame
Inception workshop and report	PMU / Uzhydromet and UNDP CO	4,000	Within first two months ofproject start up
Monthly reports	PMU	Staff time	At the end of each month
Annual reports	PMU and UNDP CO	Staff time	At the end of each year
Meetings of the Project Bo	PMU, Project director	Staff time	After the inceptionworkshop and thereafter atleast twice a year
Technical reports	PMU and External consultants	5,000	To be determined byPMU and UNDPCO
Mid-term review	PMU, UNDP CO and external consultant	20,000	At the mid-point of project implementation.
Final evaluation	PMU, UNDP CO and external consultant	25,000	At the end of projectimplementation
Final report	PMU, UNDP CO	Staff time	At least one month beforethe end of the project
Audits	PMU, UNDP CO	6,000	Yearly
TOTAL indicative COST Excluding UNDP staff and travel expenses		60,000	

D. Include a results framework for the project proposal, including milestones, targets and indicators and sex-disaggregate targets and indicators, as appropriate. The project or programme results framework should align with the goal and impact of the Adaptation Fund and should include at least one of the core outcome indicators from the AF's results framework that are applicable.

Objective: To develop climate resilience of farming and pastoral communities in the drought prone parts of Uzbekistan				
Outcomes and indicators	**Baseline**	**Targets and Milestones**	**Source of Verification**	**Outputs and indicators**
Outcome 1: Institutional and technical capacity for drought management and early warning developed **Indicator 1.1:** Number and quality of forecasts and drought early warnings for Karakalpakistan regionl; **Indicator 1.2:**Percentage of vulnerable farmers and pastoralists receivingscience-based extension services to promote drought risk reduction among vulnerable farmers and pastoralists.	The Uzhydromet provides a full coverage throughout the country. However, for a comprehensive and well functioning drought early warning system new technical skill, hardware and institutional coordination and feedback mechanisms are necessary. The density of meteorological and hydrological stations is insufficient to provide adequate coverage for drought monitoring. A wide range of data is necessary to adequately monitor climate and water supply status (i.e., precipitation, temperature, streamflow, ground water and reservoir levels, soil moisture, snow pack). These data are often not available at the density required for accurate assessments. With climate change, seasonal forecasts and warning systems	Installment of 2 Doppler water meters and 8 automated meteorological stations. At least 40,000km2 of the Karakalpakistan region will be covered by automated hydro-meteorological observation network. Season ahead forecasts and 2 weeks ahead temperature forecasts for effective warnings will be practiced; At least 40% of Dekhkan farmers and pastoralists of Karakalpak region will be served by science-based extension. At least 3 Field School / Extension established to deliver training in adaptation practices to farmers and pastoralists At least 20% of targeted Dekhkan beneficiaries will be female	Project annual reports; Mid term evaluation, final report; training test results; Hydromet bulletin	**Output 1.1:**Upgraded observation and monitoring infrastructure (e.g. 2 Doppler water meters, automatisation of 8 met stations) for effective data reception and transmission **Indicator 1.1.1:** Number of automated met stations for field data collection and transmission **Output 1.2:**Multi-moduleplatformfor integration of data flow from hydro-meteorological observation network to end users; **Indicator 1.2.1:** Coverage of hydro-meteorological observation network on km^2. **Output 1.3:**Drought early warning mechanisms (indicators, gauges, warning distribution mechanisms etc) to minimise impacts of droughts in place and functional **Indicator 1.3.1:** Lead time for drought early warning **Output 1.4:** Science-based extension services for subsistence dekhan farmers established to assist in farm-based climate risk management, including sub-district, community level Climate Field School /

	should be also linked with water user and farmer groups as well as extension services for the warnings to be effectively and timely delivered.The role of extension service becomes critically important in the context of climate change adaptation worldwide, but Uzbekistan does not yet have the extension system in place			Extension (CFS /E) established for direct outreach to farmers and localized training in adaptation practices **Indicator 1.4.1:** % Dekhkan farmers (% female Dekhkan farmers) receiving extension services to introduce farm-based climate risk management measures **Indicator 1.4.2:** Number of FieldSchool / Extension delivering training in adaptation practices to farmers and pastoralists.
Outcome 2: Climate resilient farming practices established on subsistence dekhkan farms of Karakalpakistan **Indicator 2.1:**Percentage of population adopted climate resilient conservation agriculture and water saving measures at the farm level	Water is the most limiting factor in the arid lands of Uzbekistan. Especially the regions that are located downstream suffer the most. Fears of scarcity often results in over-irrigation by upstream farmers, leaving very limited amounts of water for the downstream farmer and pastoral communities. Over-irrigation is often detrimental for the crops and cause secondary salinisation. This over reliance on irrigation system diverts the attention from water and soil conservation measures that can offer greater land and water productivity as well as greater resilience to droughts. The government is becoming increasingly aware of pressures posed by drought and climate	At least 40,000 Dekhkan farmers have adopted climate resilient conservation agriculture practices (e.g. low till, mixed cropping, fodder production, and residue crop soil covering adopted measures adopted at 80,000 ha of dekhkan farms) by end of the project; At least 40,000 Dekhan farmers have adopted water saving irrigation practices (e.g. land levelling, furrow, drip irrigation systems adopted at 80,000 ha dekhkan farms to improve farm-level drainage and minimise salinisation) by end of the project; Female lead horticulture greenhouses will be established by end of 2014	Project annual reports; Mid term evaluation, final report; Community surveys;	**Output 2.1:**40,000 Dekhkan farmers have adopted climate resilient conservation agriculture practices (e.g. low till, mixed cropping, fodder production, and residue crop soil covering adopted measures adopted at 80,000 ha of dekhkan farms); **Indicator 2.1.1:** Number of dekhkan farmers adopted conservation agriculture practices (e,g low till, mixed cropping, fodder production, and residue crop soil); **Output 2.2:**40,000 Dekhan farmers have adopted water saving irrigation practices (e.g. land levelling, furrow and drip irrigation systems adopted at 80,000 ha dekhkan farms to improve farm-level drainage and minimise salinisation); **Indicator 2.2.1:** Number of dekhkan farmers adopted water saving irrigation practices (e.g. land levelling, furrow and drip irrigation systems) **Output 2.3.**40% of targeted Dekhan farmers have established horticulture greenhouses on 20,000 ha of farms to minimise impacts of droughts on farm

	change induced reductions in water flows. In response to severe droughts of 2008/09 the government has issued the policy measures to help minimise the losses (such as fodder production, establishment of greenhouses etc). Since 2002 it has invested $1,000,000 million in agricultural modernisation, land consolidation and infrastructure upgrade. This however mainly covered private, commercial farms that replaced inefficient shirkats after the two phase reform since 2003 and more recently since 2008, when the government launched its new 'land optimisation" policy. As a result of this policy, currently, there are over 3,000 private farmers in Karakalpakstan, compared to over 9,000 farmers in 2007. The government is seeking for the options to optimise agricultural production and minimise the adverse impacts of droughts both in short and long term. The reform processes, however slow, provide positive political impetus towards the adaptation solutions.	Laws on agricultural practices and water management will be amended by to integrate regulations on the adoption of conservation agriculture and water saving techniques and technologies on the farms by end of 2016		production. **Indicator 2.3.1:** Number of female lead horticulture greenhouses established **Output 2.4.** Legal and regulatory framework put in place to support well tested farm-based adaptation measures for replication and upscale **Indicator 2.4.1:** Number of legal acts and regulations enacted to support well tested farm-based adaptation measures.

Outcome 3: Landscape level adaptation measures for soil conservation and moisture retention improves climate resilience of 1,042,094ha of land. **Indicator 3.1:** Coverage (in ha) of landscape level adaptation measures implemented for sand stabilization and moisture retention	There have been sporadic and largely unsuccessful attempts to stabilise sands and prevent their detrimental encroachment to the farm and pasture lands. With climate change induced aridification and change in intensity, direction and speed of the winds, sand movement will be augmented and productivity of farm lands further derailed. It will activate the salt migration processes. The main reasons for failed attempts to encourage larger scale rehabilitation of vegetation cover and maintenance of plantations relate to the ad-hoc nature of such efforts that are not linked with broader view of landscape functions, poorly planned coverage that do not have perceived effects on farm and pasture lands in their function of windbreaks or sand fixing barriers. Previous efforts of plantations are not planned and implemented based on climate change scenarios and wind models that are to show the dynamic of change of hysteresis line where the future plantations need to be moved and expanded.	By end of the project over 70,000 ha of arid land of Karakalpakistan is covered with saksaul and tamarix plantations to deliver sand stabilization and soil desalinization function; At least 20,000 people organized in at least 10 cooperatives at the khokimiyat and makhalla levels to participate in sand stabilization plantation scheme At least 10 community organizations (at least 5 female groups and village organizations) at khokimiyat and makhalla level have clear mandates, institutional capacities and skills to manage saksaul and tamarix plantations by end of 2015	Project annual reports; Mid-term evaluation, final report; Community Surveys; Local government budget statements; Khokimiyat and Makhalla cooperative registration records;	**Output 3.1:**Local saksaul and tamarix plantations deliver sand stabilisation and soil desalinisation function for 1,042,094 ha of farm and adjacent farmlands, based on wind models and comprehensive landscape rehabilitation and management plan **Indicator 3.1.1:** Number of ha with saksaul and tamarix plantations to deliver sand stabilization and soil desalinization function. **Output 3.2:** Community management scheme for planting and maintenance established as community employment scheme for landscape level adaptation; **Indicator 3.2.1:** Number of Dekhkan farmer and pastoral community members involved in landscape level adaptation measures (e.g. saksaul and tamarix planting) through local employment programme. **Output 3.3:** Cooperative management system for landscape rehabilitation and management established to enhance community control and ownership arrangements **Indicator 3.3.1:** Number of cooperatives established at Khokimiyat and Makhalla levels for community management of sand stabilising plantations.

Outcome 4: Knowledge of climate resilient agricultural and pastoral production systems in arid lands generated and widely available **Indicator 4.1** Percentage of population aware of and practicing well tested, climate resilient agricultural practices	While the government and rural communities are very well aware of increasing variability that is negatively affecting agricultural production and people's livelihoods there is little awareness and knowledge how to move towards climate resilient solutions. This is an underlying cause of the current situation when despite some sporadically demonstrated water saving irrigation and agronomic methods take up rates are very low and the farmers continue the same inefficient and unsustainable practices that increase their vulnerability to drought and climate change risks. Existing good practices have largely been demonstrated at the scale that makes the justification for broader application difficult. Khorezm University definitely represents a strong knowledge centre in agronomic and agricultural research. However outreach mechanism, transmission of knowledge is limited in scope (within the scientific community), not well tailored or	At least two sets of lessons learned bulletins produced to cover successful climate resilient agronomic and water saving measures; At least 5 farmland demonstration meetings covered by the local and national media for adaptation advocacy;	Project annual reports; Mid-term evaluation, final report; Community Surveys; Media clippings;	**Output 4.1:** Inventory of all tested agronomic and water saving measures to map out successful practices; **Indicator 4.1.1:** Number of documented good practices of agronomic and water saving measures. **Output 4.2:** Analysis and lessons learned for climate resilient agricultural and pastoral production systems in arid lands documented and disseminated through printed and web-based publications; **Indicator 4.2.1:** Number of lessons learned bulletins disseminated through printed and web-based media. **Output 4.3:** Quarterly farm and pasture land demonstration meetings with participation of national, local authorities, media and communities delivered; **Indicator 4.3.1:** Number of farm and pasture land demonstration meetings covered by media and attended by national and local authorities

	systematic. Moreover, any lessons learned are not being captured in a fashion that facilitates broader sharing, or that casts light on ways to address an aggravation of the food security situation during the droughts and as a result of climate change			

E. Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs

Project Budget

Award ID:	**00066434**
Project ID:	**00082613 (PIMS 5002)**
Business unit	**UZB10**
Project title:	**Developing Climate Resilience of Farming Communities in the Drought Prone Parts of Uzbekistan**
Implementing partner	**Hydrometeorological Service under the Cabinet of Ministers of the Republic of Uzbekistan (Uzhydromet)**

Project Outcome/Atlas Activity	Responsible party/ implementing agent	Donor name	Budget description	Total (USD)	yr1	yr2	yr3	yr4	yr5	yr6	Budget Notes
OUTCOME 1: Institutional and technical capacity for drought management and early warning developed											
Output 1.1 Upgraded observation and monitoring infrastructure (e.g. 2 Doppler water meters, automatisation of 8 met stations) for effective data reception and transmission	**Uzhydromet**	**Adaption Fund**	Travel	13,000	4,000	4,000	2,000	1,000	1,000	1,000	1
			Sub-Contracts	135,000	40,000	95,000					2
			Equipment for meteo stations	457,000		457,000					3
			National Experts	46,000	15,000	15,000	4,000	4,000	4,000	4,000	4
			International Experts	20,000	20,000						5
			Sub-Total Output 1.1	**671,000**	**79,000**	**571,000**	**6,000**	**5,000**	**5,000**	**5,000**	
Output 1.2 Multi-module platform for integration of data flow from hydrometeorological observation network to end users			International Experts	14,000	10,000	4,000					6
			IT equipment	244,000			244,000				7

			Stakeholder training, workshops, etc.	6,000			6,000				8
			National Experts	22,000	4,000	4,000	8,000	2,000	2,000	2,000	9
			Sub-contracts	68,000			60,000	8,000			10
			Travel	14,000	2,000	2,000	4,000	2,000	2,000	2,000	11
			Sub-Total Output 1.2	**368,000**	**16,000**	**10,000**	**322,000**	**12,000**	**4,000**	**4,000**	
Output 1.3 Drought early warning mechanisms (indicators, gauges, warning distribution mechanisms etc) to minimise impacts of droughts in place and functional	**Uzhydromet**		Stakeholder training, workshops, etc.	6,000			6,000				12
			Travel	12,000		2,000	4,000	2,000	2,000	2,000	13
			Hardware components	62,000			62,000				14
			National Experts	38,000		10,000	10,000	8,000	6,000	4,000	15
			Sub-contracts	42,000			42,000				16
			Sub-Total Output 1.3	**160,000**	**0**	**12,000**	**124,000**	**10,000**	**8,000**	**6,000**	
	Uzhydromet		Stakeholder training, workshops, etc.	12,000			6,000	6,000			17
			National Experts	8,000				8,000			18
			Travel	12,000			4,000	4,000	4,000		19
			Sub-contracts	16,000				8,000	8,000		20
			Printing & Publication	10,000		2,000	2,000	2,000	2,000	2,000	21
			Sub-Total Output 1.4	**58,000**	**0**	**2,000**	**12,000**	**28,000**	**14,000**	**2,000**	
			Sub Total Outcome 1	***1,257,000***	***95,000***	***595,000***	***464,000***	***55,000***	***31,000***	***17,000***	
OUTCOME 2: Climate resilient farming practices established on subsistence dekhkan farms of Karakalpakstan											
Output 2.1 40,000 Dekhkan farmers have adopted climate resilient conservation agriculture practices (e.g. low till, mixed cropping, fodder production, and residue crop soil covering adopted measures adopted at 80,000 ha of dekhkan farms)		**Adaptation Fund**	Travel	13,200		3,000	3,000	2,400	2,400	2,400	22

	Uzhydromet	Stakeholder training, workshops, etc.	21,000			3,000	6,000	6,000	6,000	23
		International Experts	30,000		15,000	15,000				24
		National Experts	120,000		24,000	24,000	24,000	24,000	24,000	25
		Sub-contracts	62,000		10,000	10,000	10,000	17,000	15,000	26
		Conserv. Agric. Equipment	200,000			75,000	100,000	25,000		27
		Printing & Publication	5,000		1,000	1,000	1,000	1,000	1,000	28
		Misc	5,000		1,000	1,000	1,000	1,000	1,000	29
		Sub-Total Output 2.1	**456,200**	**0**	**54,000**	**132,000**	**144,400**	**76,400**	**49,400**	
Output 2.2 40,000 Dekhan farmers have adopted water saving irrigation practices (e.g. land levelling, furrow, siphon and drip irrigation systems adopted at 80,000 ha dekhkan farms to improve farm-level drainage and minimise salinisation)	**Uzhydromet**	Travel	13,200		3,000	3,000	2,400	2,400	2,400	30
		Stakeholder training, workshops, etc.	24,000		6,000	6,000	6,000	6,000		31
		International Experts	40,000		20,000	20,000				32
		National Experts	96,000		12,000	24,000	24,000	24,000	12,000	33
		Land and Water Equipment	205,000		30,000	75,000	60,000	40,000		34
		Sub-contracts	92,000		17,000	25,000	25,000	25,000		35
		Printing & Publication	5,000		1,000	1,000	1,000	1,000	1,000	36
		Misc	7,500		1,500	1,500	1,500	1,500	1,500	37
		Sub-Total Output 2.2	**482,700**	**0**	**90,500**	**155,500**	**119,900**	**99,900**	**16,900**	
Output 2.3 40% of targeted Dekhan farmers have established horticulture greenhouses on 20,000 ha of farms to minimise impacts of droughts on farm production	**Uzhydromet**	Travel	12,000		2,400	2,400	2,400	2,400	2,400	38
		Greenhouse Equipment	235,000		30,000	80,000	70,000	55,000		39
		Stakeholder training, workshops, etc.	10,000		2,000	2,000	2,000	2,000	2,000	40
		National Experts	24,000		12,000	12,000				41

			Sub-contracts	45,000			15,000	15,000	15,000		42
			Printing & Publication	5,000		1,000	1,000	1,000	1,000	1,000	43
			Misc	7,500		1,500	1,500	1,500	1,500	1,500	44
			Sub-Total Output 2.3	**338,500**	**0**	**48,900**	**113,900**	**91,900**	**76,900**	**6,900**	
Output 2.4 Legal and regulatory framework put in place to support well tested farm-based adaptation measures for replication and upscale	**Uzhydromet**		National Experts	72,000			12,000	12,000	24,000	24,000	45
			Stakeholder training, workshops, etc.	24,000			6,000	6,000	6,000	6,000	46
			Printing & Publication	4,000			1,000	1,000	1,000	1,000	47
			Sub-Total Output 2.4	**100,000**	**0**	**0**	**19,000**	**19,000**	**31,000**	**31,000**	
			Sub Total Outcome 2	***1,377,400***	***0***	***193,400***	***420,400***	***375,200***	***284,200***	***104,200***	
OUTCOME 3: Landscape level adaptation measures for soil conservation and moisture retention improves climate resilience of 1,042,094ha of land											
Output 3.1 Local saksaul and tamarix plantations deliver sand stabilisation and soil desalinisation function for 1,042,094 ha of farm and adjacent farmlands, based on wind models and comprehensive landscape rehabilitation and management plan	**Uzhydromet**	**Adaptation Fund**	Field&Survey Equipment	550,000		50,000	100,000	150,000	150,000	100,000	48
			International Experts	20,000		10,000	10,000				49
			National Experts	120,000		24,000	24,000	24,000	24,000	24,000	50
			Stakeholder training, workshops, etc.	29,000		6,000	5,000	5,000	5,000	8,000	51
			Sub-contracts	360,000		20,000	85,000	85,000	85,000	85,000	52
			Travel	13,200		3,000	3,000	2,400	2,400	2,400	53
			Printing &Publication	5,000		1,000	1,000	1,000	1,000	1,000	54
			Misc	10,000		2,000	2,000	2,000	2,000	2,000	55

			Sub-Total Output 3.1	**1,107,200**	**0**	**116,000**	**230,000**	**269,400**	**269,400**	**222,400**	
Output 3.2 Community management scheme for planting and maintenance established as community employment scheme for landscape level adaptation	**Uzhydromet**		Stakeholder training, workshops, etc.	30,000		6,000	6,000	6,000	6,000	6,000	56
			Travel	12,000		2,400	2,400	2,400	2,400	2,400	57
			National Experts	120,000		24,000	24,000	24,000	24,000	24,000	58
			Printing and publication	5,000		1,000	1,000	1,000	1,000	1,000	59
			Misc	7,500		1,500	1,500	1,500	1,500	1,500	60
			Sub-Total Output 3.2.	**174,500**	**0**	**34,900**	**34,900**	**34,900**	**34,900**	**34,900**	
Output 3.3 Cooperative management system for landscape rehabilitation and management established to enhance community control and ownership arrangements	**Uzhydromet**		Sub-contracts	260,000			100,000	125,000	35,000		61
			Stakeholder training, workshops, etc.	24,000			6,000	6,000	6,000	6,000	62
			International Experts	40,000		20,000	20,000				63
			National Experts	96,000			24,000	24,000	24,000	24,000	64
			Travel	10,200			3,000	2,400	2,400	2,400	65
			Printing & Publication	4,000			1,000	1,000	1,000	1,000	66
			Misc	8,000			2,000	2,000	2,000	2,000	67
			Sub-Total Output 3.3	**442,200**	**0**	**20,000**	**156,000**	**160,400**	**70,400**	**35,400**	
			Subtotal Outcome 3	**1,723,900**	**0**	**170,900**	**420,900**	**464,700**	**374,700**	**292,700**	
OUTCOME 4: Knowledge of climate resilient agricultural and pastoral production systems in arid lands generated and widely available											
Output 4.1 Inventory of all tested agronomic and water saving measures to map out successful practices	**Uzhydromet**	**Adaptation Fund**	International Experts	30,000					30,000		68
			National Experts	30,000					20,000	10,000	69
			Travel	8,400					4,200	4,200	70

			Printing & Publication	8,000					4,000	4,000	71
			Misc	2,000					1,000	1,000	72
			Sub-Total Output 4.1	**78,400**	**0**	**0**	**0**	**0**	**59,200**	**19,200**	
Output 4.2 Analysis and lessons learned for climate resilient agricultural and pastoral production systems in arid lands documented and disseminated through printed and web-based publications	**Uzhydromet**		International Experts	30,000				10,000	10,000	10,000	73
			National Experts	35,000				15,000	10,000	10,000	74
			Printing & Publication	43,000				10,000	15,000	18,000	75
			Sub-contracts	24,000				5,000	9,000	10,000	76
			Msc	3,000					1,000	2,000	77
			Sub-Total Output 4.2	**135,000**	**0**	**0**	**0**	**40,000**	**45,000**	**50,000**	
Component 4.3: Quarterly farm and pasture land demonstration meetings with participation of national, local authorities, media and communities delivered	**Uzhydromet**		Travel	6,000	1,000	1,000	1,000	1,000	1,000	1,000	78
			Sub-contracts	18,000	3,000	3,000	3,000	3,000	3,000	3,000	79
			National Experts	18,000	3,000	3,000	3,000	3,000	3,000	3,000	80
			Printing and publication	12,000	2,000	2,000	2,000	2,000	2,000	2,000	81
			Misc	6,000	1,000	1,000	1,000	1,000	1,000	1,000	82
			Sub-Total Output 4.3	**60,000**	**10,000**	**10,000**	**10,000**	**10,000**	**10,000**	**10,000**	
			Sub Total Outcome 4	***273,400***	***10,000***	***10,000***	***10,000***	***50,000***	***114,200***	***79,200***	
Project/Programme Execution											
Project Management		**Adaptation Fund**	Monitoring & Evaluation Costs (incl. Travel)	45,000	7,500	7,500	7,500	7,500	7,500	7,500	83
			Contractual Services (Project Management & Administration)	252,078	42,013	42,013	42,013	42,013	42,013	42,013	84
			Supplies	62,100	10,350	10,350	10,350	10,350	10,350	10,350	85
			Sub Total Project Management	**359,178**	**59,863**	**59,863**	**59,863**	**59,863**	**59,863**	**59,863**	
			Sub Total	**359,178**	**59,863**	**59,863**	**59,863**	**59,863**	**59,863**	**59,863**	

	Project/Programme Execution								
TOTAL Project Implementation Costs		4,990,878	164,863	1,029,163	1,375,163	1,004,763	863,963	552,963	
MIE fee for services detailed in ANNEX V (8.5%)		424,225	178,099	52,487	70,133	51,243	44,062	28,201	
GRAND TOTAL		5,415,103	342,962	1,081,650	1,445,296	1,056,006	908,025	581,164	

Budget Notes:

1. Travel associated with conducted site surveys and installations of meteo stations and equipment
2. Costs of 8 meteo stations installation sub-contractors
3. Purchase of meteo equipment and 8 stations
4. National experts to provide expertise and technical assistance in identification of location and operation of 8 met stations and monitoring equipment at the field
5. International Expert (2.5 staff months) to provide expertise and technical assistance in integration of data flow from hydrometeorological observation network to end users
6. International Expert (2.5 staff months) to provide expertise and technical assistance in integration of data flow from hydrometeorological observation network to end users
7. Purchase of IT equipment (low capability computers- 20, high capability computers - 10, including 1 high capability server)
8. Costs associated with undertaking stakeholder training, workshops, etc.
9. National experts to provide expertise and technical assistance in integration of data flow from hydrometeorological observation network to end users
10. Costs of sub-contractors for establishing multi-module platform for integration of data flow from hydrometeorological observation network to end users
11. Travel associated with installation and training for maintenance of Automated weather stations
12. Costs associated with undertaking stakeholder training, workshops, etc.
13. Travel associated with introduction of drought early warning mechanisms to minimise impacts of droughts in place
14. Costs associated with the purchase of hardware components for maintenance of AWS
15. National experts to provide expertise and technical assistance in identification of drought early warning mechanisms and its locations
16. Costs of drought early warning mechanisms installation sub-contractors
17. Costs associated with undertaking stakeholder training, workshops, etc.
18. National experts to provide expertise and technical assistance in establishing science-based extension services for subsistence dekhan farmers
19. Travel associated with establishing science-based extension services for subsistence dekhan farmers
20. Costs of establishing science-based extension services sub-contractors
21. Costs of printing and publications associated with the extension services for subsistence dekhan farmers
22. Travel associated with the adoption of climate resilient conservation agriculture practices by farmers
23. Costs associated with undertaking stakeholder training, workshops, etc.
24. International Experts (3 experts of 2.5 staff months for each) to provide best practices and technical assistance in application of low till, mixed cropping, fodder production, and residue crop soil
25. National experts to provide expertise and technical assistance in practical adoption of low till, mixed cropping, fodder production, and residue crop soil at 80,000 ha of dekhkan farms
26. Costs of adoption of climate resilient conservation agriculture practices sub-contractors
27. Purchase of conservation agriculture equipment

28. Costs of printing and publications associated with the climate resilient conservation agriculture practices
29. Miscellaneous costs associated with implementation of the activity
30. Travel associated with the adoption of water saving irrigation practices by farmers
31. Costs associated with undertaking stakeholder training, workshops, etc.
32. International Experts (3 experts of 2.5 staff months for each) to provide best practices and technical assistance in application of land leveling, furrow, siphon and drip irrigation systems
33. National experts to provide expertise and technical assistance in practical adoption of 80,000 ha dekhkan farms to improve farm-level drainage and minimise salinisation
34. Purchase of land leveling, furrow, siphon and drip irrigation systems equipment
35. Costs of drainage and minimise salinisation works sub-contractors
36. Costs of printing and publications associated with the water saving irrigation practices
37. Miscellaneous costs associated with implementation of the activity
38. Travel associated with establishing horticulture greenhouses by farmers
39. Purchase of horticulture greenhouse equipment
40. Costs associated with undertaking stakeholder training, workshops, etc.
41. National experts to provide expertise and technical assistance in establishing horticulture greenhouses on 20,000 ha of farms to minimise impacts of droughts on farm production
42. Costs of establishing horticulture greenhouse sub-contractors
43. Costs of printing and publications associated with the horticulture greenhouse best practices
44. Miscellaneous costs associated with implementation of the activity
45. National experts to provide expertise and technical assistance in development/improvement of legal and regulatory framework to support well tested farm-based Adaptation measures for replication and upscale
46. Costs associated with undertaking stakeholder training, workshops, etc.
47. Costs of printing and publications associated with the best practices legal and regulatory framework to support well tested farm-based adaptation measures for replication and upscale
48. Purchase of field and survey equipment to monitor sand stabilization and soil desalinisation based on wind models and comprehensive landscape rehabilitation
49. International Expert (4 staff months) to provide best practices and technical assistance in development of management plan for sand stabilisation and soil desalinisation and comprehensive landscape rehabilitation
50. National experts to provide expertise and technical assistance in local saksaul and tamarix plantations deliver for sand stabilization and soil desalinisation based on wind models and landscape rehabilitation management plan
51. Costs associated with undertaking stakeholder training, workshops, etc.
52. Costs of Local saksaul and tamarix planting sub-contractors
53. Travel associated with the sand stabilization and soil desalinisation practices by farmers
54. Costs of printing and publications associated with the sand stabilization and soil desalinisation practices
55. Miscellaneous costs associated with implementation of the activity
56. Costs associated with undertaking stakeholder training, workshops, etc.
57. Travel associated with development of community management scheme for planting and maintenance as community employment scheme for landscape level adaptation
58. National experts to provide expertise and technical assistance in development of community management scheme for planting and maintenance as community

employment scheme for landscape level adaptation
59. Costs of printing and publications associated with the community management scheme for planting and maintenance as community employment scheme for landscape level adaptation
60. Miscellaneous costs associated with implementation of the activity
61. Costs of establishing cooperative management system for landscape rehabilitation and management sub-contractors
62. Costs associated with undertaking stakeholder training, workshops, etc.
63. International Expert (2 staff months) to provide best practices and technical assistance in establishing cooperative management system for landscape rehabilitation and management to enhance community control and ownership
64. National experts to provide expertise and technical assistance in establishing cooperative management system for landscape rehabilitation and management to enhance control and ownership
65. Travel associated with establishing cooperative management system for landscape rehabilitation and management
66. Costs of printing and publications associated with establishing cooperative management system for landscape rehabilitation and management to enhance community control and ownership arrangements
67. Miscellaneous costs associated with implementation of the activity
68. International Expert (1.5 staff months) to summarize the results of inventory of all tested agronomic and water saving measures to map out successful practices
69. National experts to provide expertise and technical assistance in inventory of all tested agronomic and water saving measures to map out successful practices
70. Travel associated with the inventory of all tested agronomic and water saving measures to map out successful practices
71. Costs of printing and publications associated with the summarized results of inventory of all tested agronomic and water saving measures to map out successful practices
72. Miscellaneous costs associated with implementation of the activity
73. International Expert (2 staff months) contribute to analysis and documentation of lessons learned for climate resilient agricultural and pastoral production systems in arid lands
74. National experts to provide technical assistance in analysis and documentation of lessons learned for climate resilient agricultural and pastoral production systems in arid lands
75. Costs of printing and publications associated with documented lessons learned for climate resilient agricultural and pastoral production systems in arid lands to be disseminated
76. Costs of dissemination through printed and web-based publications sub-contractors
77. Miscellaneous costs associated with implementation of the activity
78. Travel associated with quarterly farm and pasture land demonstration meetings with participation of national, local authorities, media and communities
79. Costs of quarterly farm and pasture land demonstration meetings sub-contractors
80. National experts to conduct quarterly farm and pasture land demonstration meetings with participation of national, local authorities, media and communities
81. Costs of printing and publications associated with quarterly farm and pasture land demonstration meetings with participation of national, local authorities, media and communities
82. Miscellaneous costs associated with implementation of the activity
83. Consultancy fee and travel costs for international expert for conducting monitoring and evaluation of the project progress
84. Contracts of project management and support staff
85. Cost of office supplies and disposables

General note regarding consultant and travel costs:

Implementation of activities in Karakalpakstan will require regular travels of the international and national consultants to Karakalpakstan (that is over 1,000 km from the capital) but also internal travels to the rural communities and pilot sites. Travel to Nukus (capital of Karakalpakstan) is by air, and actual cost of a round trip flights is approx. 130 Euro per person. Moreover, the present Daily Sustainable Allowance (standard UNDP rate), plus'terminals' (expenditures for transportation between the air terminal or other point of arrival or departure, and the hotel or place of dwelling) per person per day is $325. The duration of each mission is expected to be at least a week but, work in rural areas and with communities will require longer periods. International consultants will require coverage of the international flights, visa cost but both international and national expert travels will also include the automobile transportation to large-scale rural areas (cost of fuel, renting cars and driver services). The budget calculations also take into account the fact that over the last 5 years there have been annual increasesin national level salaries and wages (approx. 10-15%), as well as twice-a-year increases in fuel and energy prices.

As far the cost of consultant fees, the fee range requested by the international consultants varies from $600-1,000 per day. Moreover, given the limited number of international experts specialised in the required areas of farm and landscape-level adaptation strategies worldwide, and also severe working conditions in Karakalpakstan such as extreme cold (minus 20-30 ^{0}C) and hot (plus 40-50 ^{0}C) in winter and summer seasons accordingly; poor quality of drinking water (salinization and mineralization); frequent droughts, lack of hotels in rural areas, etc., cost of each assignment is quite expensive. It is also shall be taking into consideration that Karakalpakstan is the Aral Sea disaster region suffering from the corresponding impacts. The national consultant fees are at lower level but still requires substantial amount of funds as the largest part of activities will be implemented by them. National capacity development activities will require need of international expertise and transfer of best practices by international experts. As it is mentioned above, there is every year increase of the national level wages and salaries as well as goods and services in Uzbekistan.

Include a disbursement schedule with time-bound milestones

	Upon Agreement signature	1st disbursement (received at time of agreement)	One Year after Project Start[a/]	Year 3	Year 4	Year 5	Year 6	**Total**
Scheduled Date	1-May-14		14-May-15	14-May-16	14-May-17	14-May-18	14-May-19	
Project Funds		164 863	1 029 163	1 375 163	1 004 763	863 963	552 963	4 990 878
Implementing Entity Fee	169 690	8 408	52 487	70 133	51 243	44 062	28 201	424 225
Total	**169 690**	**173 271**	**1 081 650**	**1 445 296**	**1 056 006**	**908 025**	**581 164**	**5 415 103**

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

A. RECORD OF ENDORSEMENT ON BEHALF OF THE GOVERNMENT[21]

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:

Professor Victor E. Chub Designated National Authority General Director Centre of Hydro-meteorological Service Under the Cabinet of Ministers of the Republic of Uzbekistan	Date*: January 10, 2014*

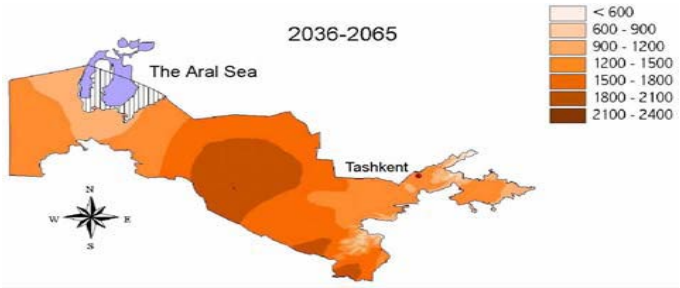
B. IMPLEMENTING ENTITY CERTIFICATION

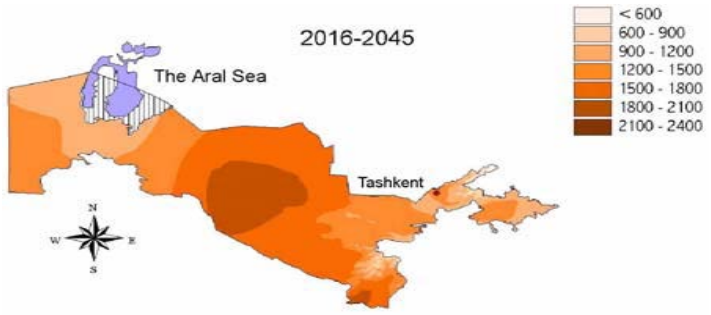
Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address

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.	
 Adriana Dinu Executive Coordinator and Director a.i UNDP - Global Environment Facility United Nations Development Programme	
Date: January 13*, 2014*	Tel. and email:+1 (212) 906-5143; adriana.dinu@undp.org
Project Contact Person: Anna Kaplina, Adaptation Specialist, UNDP Europe and the CIS, Bratislava Regional Centre	
Tel. and Email: +421 2 59 337 427; anna.kaplina@undp.org	

6. 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.

ANNEX 1 Climate History and Projections, Karakalpakstan





ANNEX 2: UNDP Environmental Finance – Specialized Technical Oversight Services (UNDP fees for Oversight of the Adaptation Fund Project)

The implementing entity fee will be utilized by UNDP to cover its indirect costs in the provision of general management support and specialized technical support services. The table below provides an indicative breakdown of the estimated costs of providing these services.

Category	Indicative Services[1] Provided by UNDP	Estimated Cost of Providing Services[2]
Identification, Sourcing and Screening of Ideas	Provide information on substantive issues in adaptation associated with the purpose of the Adaptation Fund (AF). Engage in upstream policy dialogue related to a potential application to the AF. Verify soundness and potential eligibility of identified idea for AF.	**21,211.25**
Feasibility Assessment / Due Diligence Review	Provide up-front guidance on converting general idea into a feasible project/programme. Source technical expertise in line with the scope of the project/programme. Verify technical reports and project conceptualization. Provide detailed screening against technical, financial, social and risk criteria and provide statement of likely eligibility against AF requirements. Determination of execution modality and local capacity assessment of the national executing entity. Assist in identifying technical partners. Validate partner technical abilities. Obtain clearances from AF.	**42,422.50**
Development & Preparation	Provide technical support, backstopping and troubleshooting to convert the idea into a technically feasible and operationally viable project/programme. Source technical expertise in line with the scope of the project/programme needs. Verify technical reports and project conceptualization. Verify technical soundness, quality of preparation, and match with AF expectations. Negotiate and obtain clearances by AF. Respond to information requests, arrange revisions etc.	**106,056.25**
Implementation	Technical support in preparing TORs and verifying expertise for technical positions. Provide technical and operational guidance project teams. Verification of technical validity / match with AF expectations of inception report.	**212,112.50**

	Provide technical information as needed to facilitate implementation of the project activities. Provide advisory services as required. Provide technical support, participation as necessary during project activities. Provide troubleshooting support if needed. Provide support and oversight missions as necessary. Provide technical monitoring, progress monitoring, validation and quality assurance throughout. Allocate and monitor Annual Spending Limits based on agreed work plans. Receipt, allocation and reporting to the AFB of financial resources. Oversight and monitoring of AF funds. Return unspent funds to AF.	
Evaluation and Reporting	Provide technical support in preparing TOR and verify expertise for technical positions involving evaluation and reporting. Participate in briefing / debriefing. Verify technical validity / match with AF expectations of all evaluation and other reports Undertake technical analysis, validate results, compile lessons. Disseminate technical findings	**42,422.50**
Total		**424,225.00[i]**

[1] This is an indicative list only. Actual services provided may vary and may include additional services not listed here. The level and volume of services provided varies according to need.
[2] The breakdown of estimated costs is indicative only.

Service standards:

1. Initial response to communication within 2 working days
2. Full response to communication (with the exception of a response requiring travel) within 10 working days

ANNEX 3 - Project Execution Costs

Cost Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	AF	UNDP	TOTAL (USD)
Project Manager Salary	21,650.00	21,650.00	21,650.00	21,650.00	21,650.00	21,650.00	129,900.00	12,196.00	142,096.00
National Field Coordinator Salary	15,550.00	15,550.00	15,550.00	15,550.00	15,550.00	15,550.00	93,300.00	8,732.00	102,032.00
Project Admin/Finance Assistant Salary	13,200.00	13,200.00	13,200.00	13,200.00	13,200.00	13,200.00	0	87,135.00	87,135.00
Project Driver Salary	7,801.00	7,801.00	7,801.00	7,801.00	7,801.00	7,801.00	0	51,097.88	51,097.88
Country Logistics (project vehicle)	28,000.00						28,000.00	7,120.00	35,120.00
Equipment and furniture	10,000.00						10,000.00	400.00	10,400.00
IT equipment	8,000.00						8,000.00	320.00	8,320.00
Communications	700.00	700.00	750.00	750.00	1,000.00	1,000.00	4,900.00	3,196.00	8,096.00
Supplies	800.00	800.00	900.00	900.00	1,500.00	1,500.00	6,400.00	5,256.00	11,656.00
Miscellaneous Expenses	700.00	700.00	800.00	800.00	900.00	900.00	4,800.00	5,592.00	10,392.00
Project Inception Workshop	5,000.00						5,000.00	200.00	5,200.00
Meetings of Project Board, National Inter-Agency Coordination Group, and Climate Change Country Team	1,000.00	1,000.00	1,500.00	1,500.00	2,000.00	2,000.00	9,000.00	3,360.00	12,360.00
Mid-term project evaluation			20,000.00				20,000.00	800.00	20,800.00
Final Evaluation						20,000.00	20,000.00	800.00	20,800.00
Visits to Field Sites (PB members, IAC Group, and EEU/CO)	1,000.00	1,200.00	1,500.00	1,500.00	2,000.00	2,000.00	9,200.00	3,368.00	12,568.00
Technical Reports	878.00	900.00	900.00	1,000.00	1,000.00	1,000.00	5,678.00	8,227.12	13,905.12
Audits		1,000.00		2,000.00		2,000.00	5,000.00	2,200.00	7,200.00
TOTAL							**359,178.00**	**200,000.00**	**559,178.00**

ANNEX 4 – LETTER OF CO-FINANCING BY MIE (UNDP)

United Nations Development Programme
Birlashgan Millatlar Tashkiloti Taraqqiyot Dasturi

UNDP Uzbekistan

250/OL/EEU/16/14

_07_January 2014

Subject: Letter of co-financing for the full-sized project proposal - "Developing Climate Resilience of Farming Communities in the Drought Prone Parts of Uzbekistan"

Dear Adaptation Fund Board Members and Secretariat,

UNDP country office in Uzbekistan herewith confirms co-financing to the AF project "Developing Climate Resilience of Farming Communities in the Drought Prone Parts of Uzbekistan" (PIMS 5002, Atlas IDs: UZB 10, Proposal ID: 00066434, Project ID: 00082613) in an amount of US$200,000.

As per earlier communication, there is additional cost associated with supporting the implementing partner in project implementation. UNDP therefore secured additional resources from its core budget in order to fully recover the cost of direct project services that it will provide during the entire project duration.

Using this opportunity, I thank you for your cooperation and I hope we can further continue our fruitful collaboration.

Sincerely,

Stefan Priesner
Resident Representative
UNDP in Uzbekistan

AF Board Members and Secretariat

Responsible person:
Rano Baykhanova/Programme Climate Change Specialist, EEU

Contacts: (998 71) 120 35 50 (ext. 163)

41/3, Mirabadskaya street, Tashkent, 100015, Republic of Uzbekistan
Tel: +998 71 120 34 50, 120 61 67; Fax: +998 71 120 34 85
E-mail: registry.uz@undp.org; www.undp.uz

ANNEX 5: LETTER OF ENDORSEMENT

O'ZBEKISTON RESPUBLIKASI
VAZIRLAR MAHKAMASI
HUZURIDAGI
GIDROMETEOROLOGIYA
XIZMATI MARKAZI
(O'ZGIDROMET)

100052, Toshkent shahar,
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Telefonlar: +(99871) 233 61 80
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+(99871) 237 35 11
Telegraf manzili: Toshkent ГИМЕТ
Fax: +(99871) 233 20 25
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REPUBLIC OF UZBEKISTAN
CABINET OF MINISTERS
CENTRE OF
HYDROMETEOROLOGICAL
SERVICE
(UZHYDROMET)

72, 1st Bodomzor yuli str.,
Tashkent 100052,
Republic of Uzbekistan

Telephones: +(99871) 233 61 80
+(99871) 150 86 27
+(99871) 237 35 11
Telegraph: Tashkent GIMET
Fax: +(99871) 233 20 25
E-mail: uzhymet@meteo.uz

201 4 yil 10.01. № 07-42-03

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To: The Adaptation Fund Board c/o
Adaptation Fund Board Secretariat Email:
Secretariat@Adaptation-Fund.org

Letter of Endorsement by Government

Fax: 202 522 3240/5

January 10, 2014

Subject: Endorsement for Developing Climate Resilience of Farming Communities in the Drought Prone Parts of Uzbekistan

In my capacity as designated authority for the Adaptation Fund in Uzbekistan, I confirm that the above national project/programme proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in Uzbekistan. I also confirm that the project proposal is valid and the requested funding is adequate.

Accordingly, I am pleased to endorse the above project/programme proposal with support from the Adaptation Fund. If approved, the project/programme will be implemented by UNDP and executed by the national Centre of Hydrometeorological Service in Uzbekistan.

Sincerely,

Prof. Victor E. Chub,
Minister
Designated National Authority,
UNFCCC National Focal Point, and
General Director
Centre of Hydrometeorological Service
under the Cabinet of Ministers of the Republic of
Uzbekistan

	Yr-1				Yr-2				Yr-3				Yr-4				Yr-5				Yr-6				TOTAL BUDGET (USD)
	QR-1	QR-2	QR-3	QR-4	QR-1	QR-2	QR-3	QR-4	QR-1	QR-2	QR-3	QR-4	QR-1	QR-2	QR-3	QR-4	QR-1	QR-2	QR-3	QR-4	QR-1	QR-2	QR-3	QR-4	
COMPONENT 1: Institutional capacity and mechanisms for drought risk management and early warning																									
Component 1.1: Upgraded observation and monitoring infrastructure (e.g. 2 Doppler water meters, automatisation of 8 met stations) for effective data reception and transmission			79,000		571,000				6,000					5,000				5,000				5,000			671,000
Component 1.2: Multi-module platform for integration of data flow from hydrometeorological observation network to end users		16,000				10,000			322,000					12,000				4,000					4,000		368,000
Component 1.3: Drought early warning mechanisms (indicators, gauges, warning distribution mechanisms etc) to minimise impacts of droughts in place and functional						12000			124,000					10,000				8,000				6,000			160,000
Component 1.4: Sub-district, community level Climate Field School / Extension (CFS /E) established for direct outreach to farmers and localized training in adaptation practices							2000		12,000				28,000				14,000				2000				58,000
SUB TOTAL	**95,000**				**595,000**				**464,000**				**55,000**				**31,000**				**17000**				**1,257,000**
COMPONENT 2: Climate resilient farming practices established on subsistence dekhkan farms of Karakalpakstan																									
Component 2.1: 40,000 Dekhkan farmers have adopted climate resilient conservation agriculture practices (e.g. low till, mixed cropping, fodder production, and residue crop soil covering adopted measures adopted at 80,000 ha of dekhkan farms)					54,000				132,000				144,400				76,400				49,400				456,200
Component 2.2: 40,000																									

Dekhan farmers have adopted water saving irrigation practices (e.g. land levelling, furrow, siphon and drip irrigation systems adopted at 80,000 ha dekhkan farms to improve farm-level drainage and minimise salinisation)		*90,500*	*155,500*	*119,900*	*99,900*	*16,900*	*482,700*
Component 2.3: 40% of targeted Dekhan farmers have established horticulture greenhouses on 20,000 ha of farms to minimise impacts of droughts on farm production		*48,900*	*113,900*	*91,900*	*76,900*	*6,900*	*338,500*
Component 2.4: Legal and regulatory framework put in place to support well tested farm-based adaptation measures for replication and upscale			*19,000*	*19,000*	*31,000*	*31,000*	*100,000*
SUB TOTAL	***0***	***193,400***	***420,400***	***375,200***	***284,200***	***104,200.00***	***1,377,400***
COMPONENT 3: Landscape level adaptation measures for soil conservation and moisture retention improves climate resilience of 1,042,094ha of land.							
Component 3.1: Local saksaul and tamarix plantations deliver sand stabilisation and soil desalinisation function for 1,042,094 ha of farm and adjacent farmlands, based on wind models and comprehensive landscape rehabilitation and management plan		*116,000*	*230,000*	*269,400*	*269,400*	*222,400*	*1,107,200*
Component 3.2: Community management scheme for planting and maintenance established as community employment scheme for landscape level adaptation		*34,900*	*34,900*	*34,900*	*34,900*	*34,900*	*174,500*
Component 3.3: Cooperative management system for landscape rehabilitation and management established to enhance community control and ownership arrangements		*20,000*	*156,000*	*160,400*	*70,400*	*35,400*	*442,200*
SUB TOTAL	***0***	***170,900***	***420,900***	***464,700***	***374,700***	***292,700***	***1,723,900***
COMPONENT 4: Knowledge of climate resilient agricultural and pastoral production systems in arid lands generated and widely available							

Component 4.1: Inventory of all tested agronomic and water saving measures to map out successful practices					*59,200*	*19,200*	*78,400*
Component 4.2: Analysis and lessons learned for climate resilient agricultural and pastoral production systems in arid lands documented and disseminated through printed and web-based publications				*40,000*	*45,000*	*50,000*	*135,000*
Component 4.3: Quarterly farm and pasture land demonstration meetings with participation of national, local authorities, media and communities delivered	*10,000*	*10,000*	*10,000*	*10,000*	*10,000*	*10,000*	*60,000*
SUB TOTAL	***10,000***	***10,000***	***10,000***	***50,000***	***114,200***	***79,200***	***273,400***
TOTAL	***105,000***	***969,300***	***1,315,300***	***944,900***	***804,100***	***493,100***	***4,631,700***
MIE Fee for Services	***178,099***	***52,487***	***70,133***	***51,243***	***44,062***	***28,201***	***424,225***
EXECUTION COSTS	***59,863***	***59,863***	***59,863***	***59,863***	***59,863***	***59,863***	***359,178***
GRAND TOTAL	***342,962***	***1,081,650***	***1,445,296***	***1,056,006***	***908,025***	***581,164***	***5,415,103***

Note: Some of the activities description has been shortened under this table, but its full content be referred to under Part II in the project Document.

Project Components	Expected Concrete Outputs	Expected Outcomes	Amount (US$)
1. Institutional capacity and mechanisms for drought risk management and early warning	1.1. Upgraded observation and monitoring infrastructure (e.g. 2 Doppler water meters, automatisation of 8 met stations) for effective data reception and transmission; (US$671,000) 1.2. Multi-module platform for integration of data flow from hydrometeorological observation network to end users; (US$368,000) 1.3. Drought early warning mechanisms (indicators, gauges, warning distribution mechanisms etc) to minimise impacts of droughts in place and functional; (US$160,000) 1.4. Sub-district, community level Climate Field School / Extension (CFS /E) established for direct outreach to farmers and localized training in adaptation practices; (US$58,000)	Institutional and technical capacity for drought management and early warning developed	1,257,000
2. Climate resilient agricultural and pastoral production systems	2.1. 40,000 Dekhkan farmers have adopted climate resilient conservation agriculture practices (e.g. low till, mixed cropping, fodder production, and residue crop soil covering adopted measures adopted at 80,000 ha of dekhkan farms); (US$456,200) 2.2. 40,000 Dekhan farmers have adopted water saving irrigation practices (e.g. land levelling, furrow, siphon and drip irrigation systems adopted at 80,000 ha dekhkan farms to improve farm-level drainage and minimise salinisation); (US$482,700) 2.3. 40% of targeted Dekhan farmers have established horticulture greenhouses on 20,000 ha of farms to minimise impacts of droughts on farm production; (US$338,500) 2.4. Legal and regulatory framework put in place to support well tested farm-based adaptation measures for replication and upscale; (US$100,000)	Climate resilient farming practices established on subsistence dekhkan farms of Karakalpakistan	1,377,400
3. Landscape level approach to adaptation to climate change risks of increased aridity	3.1. Local saksaul and tamarix plantations deliver sand stabilisation and soil desalinisation function for 1,042,094 ha of farm and adjacent farmlands, based on wind models and comprehensive landscape rehabilitation and management plan; (US$1,107,200) 3.2. Community management scheme for planting and maintenance established as community employment scheme for landscape level adaptation; (US$174,500) 3.3. Cooperative management system for landscape rehabilitation and management established to enhance community control and ownership arrangements; (US$442,200)	Landscape level adaptation measures for soil conservation and moisture retention improves climate resilience of 1,042,094ha of land	1,723,900
4. Knowledge management and awareness raising	4.1. Inventory of all tested agronomic and water saving measures to map out successful practices; (US$78,400) 4.2. Analysis and lessons learned for climate resilient agricultural and pastoral production systems in arid lands documented and disseminated through printed and web-based publications; (US$135,000) 4.3. Quarterly farm and pasture land demonstration meetings with participation of national, local authorities, media and communities delivered; (US$60,000)	Knowledge of climate resilient agricultural and pastoral production systems in arid lands generated and widely available	273,400
4. Project/Programme Execution cost			359,178
5. Total Project/Programme Cost			4,990,878

6. Project Cycle Management Fee charged by the Implementing Entity (if applicable)	424,225[22]
Amount of Financing Requested	5,415,103

22 On the request of the Government of Uzbekistan the project will be implemented by UNDP using the MIE modality.

Alignment of Project Objectives/Outcomes with Adaptation Fund Results Framework

Any project or programme funded through the Adaptation Fund (AF) must align with the Fund's results framework and directly contribute to the Fund's overall objective and outcomes outlined. Not every project/programme outcome will align directly with the Fund's framework but at least one outcome and output indicator from the Adaptation Fund's Strategic Results Framework must be included at the project design stage.

There is currently, no place within the project document where an explicit link to the AF's results framework is delineated. As such, the secretariat is requesting project proponents to fill out the table below to directly link, where relevant, project objectives and outcomes to the Fund level outcome and outputs.

Project Objective(s)	**Project Objective Indicator(s)**	**Fund Outcome**	**Fund Outcome Indicator**	**Grant Amount (USD)**
to develop climate resilience of farming and pastoral communities in the drought prone parts of Uzbekistan	Percentage of population with improved adaptive capacity and reduced vulnerability to drought impacts;	**Outcome 2:** Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	**Indicator 2.1:** No. and type of targeted institutions with increased capacity to minimize exposure to climate variability risks **Indicator 2.2:** Number of people with reduced risk to extreme weather events	$2,980,900
to develop climate resilience of farming and pastoral communities in the drought prone parts of Uzbekistan	Percentage of population that adopted climate resilient farming and pastoral practices	**Outcome 3:** Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	**Indicator 3.1:** Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses **Indicator 3.2:** Modification in behavior of targeted population	$1,650,800
Project Outcome(s)	**Project Outcome Indicator(s)**	**Fund Output**	**Fund Output Indicator**	
Institutional and technical capacity for drought	Number and quality of forecasts and drought early	***Output 2.1***: Strengthened capacity	***Indicator 2.1.1:*** No. of staff trained to respond	$1,039,000

management and early warning developed	warnings for Karakalpakistan regionl;	of national and regional centres and networks to respond rapidly to extreme weather events	to, and mitigate impacts of, climate-related events	
Institutional and technical capacity for drought management and early warning developed	Percentage of vulnerable farmers and pastoralists receiving science-based extension services to promote drought risk	***Output 2.2:*** Targeted population groups covered by adequate risk reduction systems	***Indicator 2.1.2:*** Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased	$218,000
Climate resilient farming practices established on subsistence dekhkan farms of Karakalpakistan	Percentage of population adopted climate resilient conservation agriculture and water saving measures at the farm level	***Output 3***: Targeted population groups participating in adaptation and risk reduction awareness activities	***Indicator 3.1.1:*** No. and type of risk reduction actions or strategies introduced at local level	$1,377,400
Landscape level adaptation measures for soil conservation and moisture retention improves climate resilience of 1,042,094ha of land	Coverage (in ha) of landscape level adaptation measures implemented for sand stabilization and moisture retention	***Output 2.2:*** Targeted population groups covered by adequate risk reduction systems	***Indicator 2.2.1:*** Percentage of population covered by adequate risk-reduction systems ***Indicator 2.2.2:*** No of people affected by climate variability	$1,723,900
Knowledge of climate resilient agricultural and pastoral production systems in arid lands generated and widely available	Percentage of population aware of and practicing well tested, climate resilient agricultural practices	***Output 3***: Targeted population groups participating in adaptation and risk reduction awareness activities	***Indicator 3.1.2:*** No. of news outlets in the local press and media that have covered the topic	$273,400

AF Results Framework

Objective: Reduce vulnerability and increase adaptive capacity to respond to the impacts of climate change, including variability at local and national levels.

EXPECTED RESULTS	INDICATORS
Goal: Assist developing-country Parties to the Kyoto Protocol that are particularly vulnerable to the adverse effects of climate change in meeting the costs of concrete adaptation projects and programmes in order to implement climate-resilient measures.	
Impact: Increased resiliency at the community, national, and regional levels to climate variability and change.	
Outcome 1: Reduced exposure at national level to climate-related hazards and threats	1. Relevant threat and hazard information generated and disseminated to stakeholders on a timely basis
Output 1: Risk and vulnerability assessments conducted and updated at a national level	1.1. No. and type of projects that conduct and update risk and vulnerability assessments
	1.2 Development of early warning systems
Outcome 2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	2.1. No. and type of targeted institutions with increased capacity to minimize exposure to climate variability risks
	2.2. Number of people with reduced risk to extreme weather events
Output 2.1: Strengthened capacity of national and regional centres and networks to respond rapidly to extreme weather events	2.1.1. No. of staff trained to respond to, and mitigate impacts of, climate-related events
Output 2.2: Targeted population groups covered by adequate risk reduction systems	2.1.2. Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased
	2.2.1. Percentage of population covered by adequate risk-reduction systems
	2.2.2. No. of people affected by climate variability
Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses
	3.2. Modification in behavior of targeted population

Output 3: Targeted population groups participating in adaptation and risk reduction awareness activities	3.1.1 No. and type of risk reduction actions or strategies introduced at local level
	3.1.2 No. of news outlets in the local press and media that have covered the topic
Outcome 4: Increased adaptive capacity within relevant development and natural resource sectors	4.1. Development sectors' services responsive to evolving needs from changing and variable climate
	4.2. Physical infrastructure improved to withstand climate change and variability-induced stress
Output 4: Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	4.1.1. No. and type of health or social infrastructure developed or modified to respond to new conditions resulting from climate variability and change (by type)
	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types)
Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress	5. Ecosystem services and natural assets maintained or improved under climate change and variability-induced stress
Output 5: Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	5.1. No. and type of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type of assets)
Outcome 6: Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	6.1 Percentage of households and communities having more secure (increased) access to livelihood assets
	6.2. Percentage of targeted population with sustained climate-resilient livelihoods
Output 6: Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability	6.1.1.No. and type of adaptation assets (physical as well as knowledge) created in support of individual- or community-livelihood strategies
	6.1.2. Type of income sources for households generated under climate change scenario
Outcome 7: Improved policies and regulations that promote and enforce resilience measures	7. Climate change priorities are integrated into national development strategy
Output 7: Improved integration of climate-resilience strategies into country development plans	7.1. No., type, and sector of policies introduced or adjusted to address climate change risks
	7.2. No. or targeted development strategies with incorporated climate change priorities enforced

[i]CIA World Factbook, https://www.cia.gov, accessed 8-09-2009.
[ii] CACILM- UNPD-GEF project document: “Achieving Ecosystem Stability on DegradedLand in Karakalpakstan and the KyzylkumDesert”.
[iii]Second National Communication 2007.
[iv]Second National Communication 2007.
[v]Second National Communication 2007.
[vi]Second National Communication 2007.
[vii]Second National Communication 2007.
[viii]World Bank Central Asia Climate Change Report 2009.
[ix]Second National Communication 2007.
[x] CACILM- UNPD-GEF project document: “Achieving Ecosystem Stability on DegradedLand in Karakalpakstan and the KyzylkumDesert”.
[xi] CACILM- UNPD-GEF project document: “Achieving Ecosystem Stability on DegradedLand in Karakalpakstan and the KyzylkumDesert”.
[xii]Second National Communication 2007.
[xiii] CACILM- UNPD-GEF project document: “Achieving Ecosystem Stability on DegradedLand in Karakalpakstan and the KyzylkumDesert”.
[xiv]UNDP IWRM project document.
[xv] CACILM- UNPD-GEF project document: “Achieving Ecosystem Stability on DegradedLand in Karakalpakstan and the KyzylkumDesert”.
[xvi]Kokorin, A. 2008.World Bank Adaptation Report.
[xvii]Second National Communication 2007.
[xviii]Kokorin, A. 2008.World Bank Adaptation Report.
[xix]Second National Communication 2007.
[xx]Second National Communication 2007.
[xxi]Second National Communication 2007.
[xxii]Second National Communication 2007.
[xxiii]Second National Communication 2007.
[xxiv]World Bank Report 2009.
[xxv]UNDP-GEF-SCCP ‘Achieving Sustainable Agriculture and Food Security in Uzbekistan in the Face of Climate Change’ PIF.
[xxvi] Second National Communication 2007.
[xxvii] Second National Communication 2007.
[xxviii] UNDP IWRM project document.
[xxix] Second National Communication 2007.