

Country: **Uzbekistan**

Project title: **Sustainable agriculture practices in the drought-affected region of Karakalpakstan**

Project symbol: **TCP/UZB/2903 (A)**

Starting date: **October 2003**

Completion date: **September 2005**

Government counterpart institution responsible for project execution: **Ministry of Agriculture and Water Resources**

FAO contribution: **US\$367 000**

Signed:

(on behalf of the Government)

Signed

Jacques Diouf
Director-General
(on behalf of FAO)

Date of signature:

Date of signature:

I. BACKGROUND AND JUSTIFICATION

After the 1999 drought, in 2000 and 2001, Northwest Uzbekistan experienced the worst drought and water shortage in living memory. The Autonomous Republic of Karakalpakstan (KK), which is located at the tail-end of the Amudarya River, and includes its delta into the Aral Sea, was particularly affected. The area is naturally arid and, with an annual rainfall of only 110 mm, humans, animals and agriculture are almost entirely dependent on the residual flow in the Amudarya River for survival. River flow fell dramatically and the consequent impact on the rural population, livestock and crop agriculture was disastrous, with an emergency situation prevailing in many areas, particularly in northern districts. As crops and drinking water supplies failed over two successive seasons, some 500 000 people were at short of adequate food or drinking water.

The origins of this disaster were both man-made and natural. The main cause is mismanagement of water resources in the river basin, compounded by diminishing snow and glacier melt, a declining trend in rainfall, and possible long-term climatic change. There is general consensus amongst scientists and farmers that water availability at the tail end of the Amudarya River is in decline. There are interventions underway in the river basin, aimed at improving efficiency in water management and utilization, and the Government has been providing assistance to vulnerable farmers repeatedly affected by drought in KK.

Current activities in KK are almost exclusively focused on emergency humanitarian aid, with negligible support for agriculture. Located over 1 000 km from the nation's capital, in a precarious natural environment, the region has received limited support for agriculture over the past decade, since independence.

The three main crops grown in KK are cotton, wheat (under "State Order"), and rice. Cotton still dominates irrigated cropping but nothing like to the same extent as it did in the 1980s. Cereal crops have largely replaced cotton, although potatoes, fruit and vegetables are important in some areas as private markets have expanded. Lucerne and other forage crops are second only in importance to cotton, although the lucerne area has diminished considerably in the last eight-ten years during 1999, 2000 and 2001 (some forecast figures).

Rice, cotton and wheat are grown either continuously or in rotation together. Originally, cotton was grown in rotation with lucerne; three years of lucerne followed by five-six years of cotton, which already leads to marginal and hardly sustainable soil management. Legume/crop rotation is extremely important for soil health and to control harmful pathogens. The absence of lucerne in current crop rotations has decreased humus/organic matter (by 30 percent or more) and essential micronutrients. It has also eliminated natural soil nitrogen and removed the soil structure benefits derived from the lucerne root system. In addition, the repetitive monocrop or cotton-wheat system tends to form plough plans, which block root penetration and prevent water percolation.

Three successive years of drought (1999-2001) has inflicted serious damage on the agricultural sector of KK. Gross production of the three main crops – rice, cotton and wheat have fallen by 75 percent, 11 percent and 52 percent respectively in 2001 as compared to 2000. This, after output of rice and cotton had fallen by 90 percent and 36 percent respectively the previous year (only wheat production had increased by 19 percent).

The most critical and contentious agronomic issue, for KK in particular, relates to the continued cultivation of rice. Fortunately, because of the drought and water shortage, rice cultivation has been severely curtailed and there are encouraging signs that the only rice cultivation in the future will be for seed, but even that is thought impractical. Crop yields are extremely low and deteriorating season by season, when compared to country-wide averages (1994-1999) in the public sector of 2.45 t/ha for rice, 2.05 t/ha for wheat and 2.41 t/ha for cotton. Private farmers can be expected to yield, on average, twice that of the public sector for rice and wheat.

The region is also at shortage of tractors and machinery, resulting neither in field operations neither being carried out correctly nor in a timely manner. This is particularly true for the private farmers who are given the lowest priority after the *shirkhats* when it comes to machinery scheduling. Conservation agriculture (CA) based on minimum tillage techniques should be introduced for crop establishment in order to reduce the tractor and machinery requirements per hectare, conserve soil moisture through reduced cultivation and improve yields. Conventional tillage systems which turn the soil over and move it several times expose the soil surface to the sun and wind, causing it to lose valuable moisture and dry out. Field grading and levelling need to be performed much more effectively in order to improve efficiency of irrigation application and crop water utilization. Level field technologies can achieve yield increases of 20-40 percent for wheat and cotton and seasonal water use reduction of up to 50 percent.

Soil degradation from continual rice, cotton and to a lesser extent wheat cultivation continues unabated. In order to reduce soil degradation and improve soil structure in KK, careful incorporation of crop residues and farmyard manure (FYM) must be encouraged. Both mechanisms also make a very beneficial contribution to the nutrient status and fertility of soils, particularly where fertilizer is in short supply.

A small number of state-controlled enterprises decide the terms and conditions of supplies and services such as seeds, fertilisers, pesticides and machinery. Due to traditional ties between the state enterprises and the state farms, they get the supplies first and private farmers and household plots then obtain their supplies through the state farms. The national seed monopoly, *Uzsabsavotnaveourouglare*, is responsible for producing, importing (if necessary) and distributing seeds under the MAWR. Fertilizers and pesticides are expensive at a Government-controlled price and often in short supply; as a result both are significantly underutilized – current fertilizer use is perhaps 50 percent of recommended rates.

There are no special agricultural extension services in Uzbekistan. These responsibilities are under the Ministry of Agriculture and its regional and district departments, and by research organizations. USPCA (Uzbek Scientific Production center of Agriculture) is responsible for the management of the Agricultural Research System. It has a network of agricultural research institutes all over the country with national and regional mandates for various areas of agriculture (grain, horticulture, livestock, plant protection, etc.) with affiliated farms and other facilities. SANIIRI is a scientific-production amalgamation with national mandate on crop irrigation. It has a research staff, designing unit and production unit to manufacture equipment and tools for irrigation facilities.

SANIIRI works directly under the MAWR subordinating to the First Deputy Minister (in charge of water management). The Ministry avails itself of technical support staff of SANIIRI for the implementation of its policies in the field of irrigation, as they use technical support of the USPCA in

any other area of agriculture. SANIIRI is not under the USPCA because until recently USPCA was under the Ministry of Agriculture whereas SANIIRI was under the Ministry of Water Resources before these Ministries merged.

The water demand from current farming practices cannot be sustained, and the consequences of non-action will be increasing desertification around the Aral Sea, which will progressively engulf greater areas of KK, with disastrous social consequences.

For these reasons, there is an urgent need to pilot changes in irrigation and agricultural practices in the region in order to address the issue of declining water availability - this is a high priority for the Governments of Uzbekistan and KK. Farmers have limited experience in water conservation practices and utilizing salt and more drought tolerant crops. The government does not have the relevant technical expertise, but recognizes the need for radical change in both agricultural policy and practices for the region. It is therefore requesting FAO's assistance in introducing conservation-effective water and soil management practices and introducing more drought and salt tolerant crops on a pilot scale, for possible adoption on a wider scale. The formulation mission was assured of substantive support for the proposed interventions (at both local and national level), and follow-up actions in the event of demonstrable success.

The proposed project will introduce, on a pilot scale, an integrated package of more sustainable agricultural practices, including CA practices and on-farm water management with the primary objective of utilizing the scarce water resources in an efficient and sustainable manner. CA practices will include introduction of practices in maintaining soil cover, direct planting/seeding with minimal soil disturbance, appropriate crop rotations, soil mechanization techniques and on-farm water management through improved land levelling, drainage and water saving technologies as well as water control and crop irrigation scheduling using deficit irrigation practices and saline soil leaching, with the primary objective of utilizing the scarce water resources in an efficient and sustainable manner.

The proposed project will complement the TCP/UZB/2801 "Integrated Management for Sustainable Use of Salt-affected and Gypsiferous Soils", which is currently being implemented in other areas of Uzbekistan, mainly focused on soil management for grain and cotton production. The current project would introduce some diversification elements from these productions, through different agricultural integrated practices. Some of the studies and guidelines produced by TCP/UZB/2801 could be used as reference materials for this assistance.

Cooperation will be established with on-going research efforts in water conservation projects, including:

- i) the ADB supported "On-farm Soil and Water management for Sustainable Agricultural Systems in Central Asia" ;
- ii) the conservation agriculture research and development project conducted in Uzbekistan since April 2000 at the Research Farm of Tashkent Institute of Irrigation and Agricultural Mechanization Engineers (TIAME) near Tashkent, Uzbekistan, in cooperation with Massey University, New Zealand. Asia Development Assistance Facility (ADAF) and the New Zealand Agency funded the project for International Development (NZAID);
- iii) the Crop Irrigation Management for Combating Irrigation Induced Desertification in The Aral Sea Basin, implemented with financial assistance of the European Union by the Scientific-Information Centre of the Interstate Commission for Water Coordination

(SICICWC), Central Asia and the Scientific Research Institute of Irrigation (SANIIRI) in Tashkent.

Regional cooperation will be promoted through the regional programmes and initiatives in water conservation and crop irrigation management. The project will also establish close linkages with other international organizations, such as ICARDA, CIMMYT and IWMI operating in Central Asia.

The package of integrated CA and on-farm water management practices, which will be introduced by the project, is expected to yield demonstrable benefits in both financial and environmental terms, serving as a catalyst for GOU and donors to embark on substantive development initiatives. The main donors expressed their support for the proposed project, and endorsed the nature and scope of interventions for possible replication in drought-affected regions of the country. The project should provide an important basis to further Government's development efforts in these areas, which are presently in dire need of assistance to restore agricultural production on a sustainable basis and beyond the emergency interventions, which have prevailed up to now.

This project was prepared at the request of the Government of Uzbekistan for FAO's assistance in mitigating the consequences of water shortage in the northern regions. This FAO intervention will demonstrate commitment towards addressing the agricultural problems underlying the severe drought and emergency situation experienced during the past years. The intervention is consistent with the goals of MAWR, and the lessons learned will contribute towards future development initiatives.

II. OBJECTIVES OF THE ASSISTANCE

The overall objective of the project is to demonstrate alternative, profitable and more sustainable forms of agricultural production methods such as appropriate water and soil conservation practices and Conservation Agriculture (CA) for small independent farmers in KK, where water is a very scarce, valuable and a diminishing resource.

More specifically, the immediate project objectives in the proposed pilot area are to:

- provide appropriate training to farmers and extension workers in the adoption of water conservation technologies, improved irrigation management and CA practices;
- adopt and test water saving technologies of irrigation, drainage and land reclamation, and define appropriate irrigation management practices that will ensure a more effective water supply, improve on-farm water use efficiency, ensure a timely and appropriate water supply to irrigated crops and prevent salinity;
- introduce and test machinery and technologies compatible with conservation agriculture and for timely agricultural practices including appropriate training in the use, repair and maintenance;
- introduce alternative crops and cropping systems that will optimize productivity under present limited water and salinity conditions;
- define agricultural practices and inputs that will increase and intensify the production;
- provide quality seed of salt and water stress tolerant varieties for the crops being introduced under the project;
- introduce sustainable systems of farm production, including forage production and livestock;

- provide experience and results, which can be replicated in other areas of KK and Uzbekistan.

The project will also support the international community's efforts to find solutions for this poor and struggling region, where the livelihoods of a largely rural population have been destroyed by the repeated droughts. There are huge agricultural and water-related problems in KK which need to be tackled by donor agencies involved in Uzbekistan, and this pilot project may provide some of the answers which can then be expanded or replicated in other areas of KK or Uzbekistan.

III. PROJECT OUTPUTS

The outputs from this assistance in four pilot sites in an area of around 500ha will be:

- improved irrigation and on-farm water management practices to ensure a reliable water supply and efficient and economic water use for optimal crop production;
- better drainage and other control methods to moderate the effects of soil salinity;
- improved crops productivity through integrated crop management and CA, in particular, salt and water stress tolerant cultivars, timing of irrigation application during crop establishment and later in the season, the use of permanent beds with crops sown on shoulders, and appropriate fertiliser use and application;
- more diverse crop products for small-scale processing and better marketing ;
- some 80 farmers (around 20 per pilot site) and around 15 technicians trained in the philosophy and approach developed on the pilot farms;
- lower and more efficient water utilization for the new crop rotations introduced, as compared to traditional mono-cropping systems; and
- recommendations to extend the pilot farm approach into further regional and national programmes linked to international donor agencies working along similar lines in KK and Uzbekistan.

These results will contribute to improve the financial returns from the farming systems which are developed on the pilot farm and the socio-economic conditions of vulnerable farmers.

IV. WORK PLAN

The overall agricultural concept of the project is detailed in Annex 2.

1. Implementation arrangements:

The project will be executed by the MAWR of GOKK, with on-site technical guidance and support being provided through the contractual services of ICARDA and competent national and regional institutes and agencies, over the two-year duration of the project. The contract will include assistance in the formation and strengthening of a water user association (WUA), improved on-farm water management, conservation agriculture and integrated crop management.

FAO technical specialists from headquarters will provide technical monitoring and backstopping namely crops (AGPC), agricultural machinery (AGST), irrigation and water management (AGLW) and land management (AGLL). A start-up mission will be implemented by a two-person FAO technical

team to assist in the selection of the pilot sites, the preparation of a detailed work plan and the contractual arrangements with the implementing agencies. Additional visits are envisaged, at, mid-term, and conclusion.

GOKK will appoint a National Project Coordinator (funded by KK), to be located on-site and provide full-time supervision during implementation of the project. GOKK will obtain concurrence from FAO on the choice of National Project Coordinator.

2. ICARDA Contribution and Supporting Arrangements:

Close co-operation in the implementation of the project will be sought with ICARDA, who has a recognized experience and capacity in the implementation of on-farm soil and water management practices and is committed to the development of reduced tillage technology and crop diversification for more sustainable agricultural systems. It has an office in Tashkent and substantial experience in the implementation of projects in Uzbekistan, which include an ADB supported project “On-farm soil and water management for sustainable agricultural systems in Central Asia” focusing on crop diversification, soil conservation tillage, moisture conservation and improving farm level irrigation and drainage management.

ICARDA’s services in the implementation of the project will be sought through a formal contractual agreement, for which adequate resources are allocated in the project. ICARDA will draw on established linkages with the researchers and the farming communities in KK and contribute the time of its headquarters and regional staff as well as the supporting services of its office in Tashkent. It will be contracted to take responsibility for the provision of technical inputs, including field monitoring, for the activities in KK, as detailed in Annex 1. It will also facilitate the smooth operations of the project.

3. Criteria for site selection

The GOKK, in consultation with the GOU, will pre-identify four potential sites in KK, comprised in a hydraulic unit of about 500ha, each satisfying the following criteria:

- occupied by some 20 private family farms;
- assured supply of irrigation water (80 percent probability). The site will be located in the southern portion of KK, as close as possible to the main supply canal (within a distance of 5km), and no more than 30km from the Amudarya River (Takhitash barrage);
- reasonable proximity to Nukus town (within one hour’s travel time), and readily accessible by road,
- private ownership of the land;
- exemption from the state controlled production system (state orders);
- exclusion of rice from the cropping pattern; and
- both upstream and on-site irrigation infrastructure to be in good condition. The water delivery system to the project site and within the selected hydraulic unit must be in sufficiently good condition to ensure delivery of irrigation water to all farmers. Water control structures (diversion gates, weirs, etc) must be functioning satisfactorily.

The final site selection will be jointly made by representatives from GOKK, the National Project Coordinator and FAO technical staff at the start of the project.

4. Agricultural inputs

In the first year of the project (including a summer and a winter cropping seasons), quantities of the following range of seeds will be provided for the farmers on the pilot farm. Wheat seed is readily available, and will not be provided by the project.

CROP	YEAR			
	Year I		Year II	
	Area planted	Seed quantity	Area planted	Seed quantity
Sunflower	150 ha	2.25 mt	150 ha	2.25 mt
Soya Bean	150 ha	6 mt	150 ha	6 mt
Sorghum	50 ha	0.5 mt	40 ha	0.4 mt
Maize	50 ha	1.5 mt	40 ha	1.2 mt
Forage Mixture	-		15 ha	0.5 mt
Lucerne/Alfalfa	100 ha	2 mt		
Other Crops			5 ha	0.2 mt
TOTAL	500 ha	12.25 mt	400 ha	10.55 mt

Concurrently, ICARDA, CIMMYT and ICRISAT will provide selected cultivars of wheat, maize, sorghum and forages to be screened under local conditions. The project will establish the screen test with farmers in order to identify best-adapted material.

In the second year, farmers will be expected to use seed saved from the previous year's harvest. Some additional inputs, i.e. fertilizer of a type which cannot be obtained locally, together with Glyphosate and other selective herbicides used for direct drilling, will be purchased by the project if necessary. The project will provide funds for the repair and conversion of existing planters to suit the new crops, and purchase a new combine harvester with a range of heads suitable for these crops.

5. Monitoring and evaluation

The impact of the new technologies (farm machinery and agricultural inputs) provided under the project, together with the constraints encountered in their introduction, will be monitored and evaluated through impact assessment studies and regular reporting by farmers and project staff of the following key indicators:

- crop selection;
- land rehabilitation
- cropping intensity;
- irrigated areas;
- water use;
- new machinery use;
- use of agricultural inputs (seed) provided;
- yields of crops grown; and
- marketing of production.

On the basis of a local contract a baseline study of the appropriate parameters will be defined at the inception of the project, and procedures laid down for regular collection of data (see Annex 1.2) After each cropping season, relevant data from the farmers on the pilot project will be collected and evaluated. These data should lead to recommendations of any changes to be implemented by the farmers for the next crop cycle.

6. Activities

The project will undertake the following activities:

2. Adoption of water saving technologies of irrigation, drainage and salinity management.
3. Introduction of new prototypes and modification of existing planters/drills (1), sprayers and harvester combines in the central machinery pool, for direct drilling of the crops with no-tillage to be grown under the new project.
4. Screen cultivars of salt and water stress tolerant crops for best adaptation to local conditions. Using identified cultivars, establish demonstration trials to determine: i) optimum crop establishment practices including timing of irrigation application and direct sowing; ii) possible use of beds with crops sown on shoulders for increased productivity and water use efficiency; iii) best crop sequence and water management for higher water use efficiency and salt control; iv) appropriate fertilizer use and application.
5. Socio-economic studies of adoption of recommended water saving and soil conservation technologies, and crop diversification.
6. Training of the private farmers involved in the project together with extension staff on integrated crop management, improved irrigation and water conservation practices with key topics related to the introduction of new range of crops, weed control (use of chemicals), crop residues/cover crops, crop rotations, direct drilling, irrigation frequency, harvest, and crop storage.
7. Twelve field days (six per season) bringing together participating/neighbouring farmers, extension agents and researchers in the field to observe and discuss key field demonstrations. Organized traveling workshops to adjacent countries to study experience on water saving and soil conservation technologies in small farming systems.

At the end of the project, it is expected that the water conservation technologies will have been sufficiently validated by the core farmers, for a programme to be prepared for surrounding farmers in nearby districts.

Schedule of activities (see details in Annex 3)

The project is expected to last for two years. It will be implemented on a 500-hectare pilot farm unit, incorporating 20 independent farmers owning each 25 ha. It is designed to initiate the transition from a currently ineffective and unsustainable farming system to a resource-saving, sustainable and profitable system based on Crop Diversification principles and Reduced Tillage technologies. The development of the project has progressed along the following lines:

¹ In 2002, TIAME and Ultra-Fon (UF) Company of Tashkent jointly manufactured a direct seed planter for grain crop (24 rows, 3.6 m wide).

- **Identification of suitable technologies.** Selection of suitable water management and water conservation practices, cropping diversification and mechanization technologies for the project area in KK, drawing on the experience of local research institutions and relevant water saving irrigation, drainage and salinity management, reduced tillage cropping systems in various regions of the world (e.g. Russia, USA, Canada, Brazil, Europe). To be carried out on contract basis by a local institution.
- **Identification of needs for improvement of irrigation and drainage infrastructure.** It will be conducted by local water management organization on a contract basis. Modification and establishment of demonstration sites of water saving technologies, soil leaching, installation of water accounting devices under the monitoring of local water management organization and of local water expert.
- **Identification and modification of suitable equipment.** Identification and modification of suitable farmer and local equipment, particularly for direct seeding, residue management (combine-chopper, straw spreader) and spraying of herbicides. Their modification and construction, overseen by the national consultant and the AGSE Officer, would be carried out by local machinery manufacturers or the central machinery station.
- **Identification of diversified cropping system.** Identification and validation of suitable alternative field crops and crop management practices in order to diversify away from rice and cotton and improve sustainable crop production. Previous related work in KK will be reviewed, in particular, ICARDA's work on identification of adapted barley cultivars to KK condition, e.g. salt-tolerant "Unumly-Arpa" barley cultivar.
- **Training.**
 - Organization of on-the-job training and validation for the project farmers on CA such as reduced tillage technologies, chemical weed control, soil moisture conservation, crop residue management, direct seeding and reducing high mechanization costs of traditional operations.
 - Organization of training and demonstrations of alternative field crops in rotations to diversify their traditional cropping systems.
 - Organization of training and demonstrations of techniques for improved on-farm irrigation management, soil leaching, water accounting and soil reclamation on the basis of Water User Associations.
- **Follow-up.** Before project termination, a workshop will be organized for the main Government stakeholders and potential donors. The purpose of this workshop is to take stock of project achievements in the field of sustainable land, crop and water management measured against the project objectives. The main stakeholders will discuss both the principle benefits and also drawbacks of the tested new technologies. The results and conclusions of this project analysis will provide the basis for the preparation and drafting of an outline programme (i.e. main features) of follow-up interventions designed to be submitted to interested donors.

At project inception, following approval of this TCP project and release of funds by FAO, a detailed work plan will be prepared during the inception mission of the FAO technical team.

V. CAPACITY BUILDING

The project aims at creating general awareness for sustainable agricultural practices such as improved irrigation water management and Conservation Agriculture and strengthening the capability and skills of farmers, extension agents, and staff of MAWR, in developing crop production through diversification and reduced tillage practices, water saving irrigation, drainage and land reclamation along sustainable, environmentally friendly and profitable lines. This will be achieved through three workshops (inception, mid-term and final) to discuss the work plan and review progress achieved.

Policymakers from the MAWR, participating farmers and researchers will be invited to discuss the project-concept and the project work plan. They will also participate in at least three field days throughout the cropping seasons.

During the first planting season, two selected local CA specialists (one mechanization and one cropping systems specialist) will undertake a four-week study tour to Mexico to exchange experience with local farmers and experts who are practising mechanized production systems under irrigated CA-technology.

To prepare for on-farm training, formal training courses will be organized for participating farmers and researchers/technicians to address concepts of improved community water management, technical aspects of land and crop management under CA as well as participatory research and extension methodology.

All on-farm training will be carried out within the Water User Associations (WUA). Throughout the project duration the local CA-experts will accompany the project farmers in a joint learning process and develop and adapt the CA technologies together with the farmers. There will be regular on-farm training sessions and field demonstrations to which farmers, extension staff and MAWR staff will be invited. Neighbouring farming communities will be encouraged to participate in observing the field tests so as to initiate a farmer- to-farmer extension and exchange.

The project will enable farmers of the drought-affected areas of KK to test and demonstrate the sustainability and profitability of new farming practices using inputs that are identified as most appropriate to the physical conditions of the area. It will also assist in the formation of a WUA, with the objectives of improving on-farm water management and taking responsibility for operation and maintenance of farm-level system (500 ha).

VI. INPUTS TO BE PROVIDED BY FAO

The project will cover the costs of the following:

1. Personnel Services

1.1 National consultants (Terms of Reference in Annex 6)

- Land and Water Management: six months WAE
- Conservation Agriculture and Cropping Systems: 10 months WAE
- Irrigation: ten months WAE
- Farm Mechanisation: four months WAE
- Soil and Land Management: three months WAE

1.2 Administrative Support

To cover costs for the service driver/administrative assistant (for up to US\$6 000), interpreter during the FAO missions and training activities, as appropriate (for up to US\$2 500) and translator for documents/technical guidelines/reports translation (for up to US\$2 500).

1.3 FAO Advisory Technical Services (ATS) (TORs in Annex 5)

- AGPC: six weeks in three missions. The first mission will assist in start-up of activities, participation in the first Awareness Creation workshop. The second mission will take place during the second season in order to carry out a field survey on the adoption of recommended technologies and their impact on the production system. The third mission towards the end of the project to review project achievements and to participate in the follow-up workshop.
- AGLW: four weeks in two missions. The first mission will assist in start-up of activities, participation in the first Awareness Creation workshop. The second mission towards the end of the project to review project achievements and to participate in the follow-up workshop.
- AGST: four weeks in two missions. The first mission will take place at project start-up to assist in the identification of suitable equipment and propose appropriate modifications for CA adaptation. The second mission at the beginning of the second season for assisting farmers in the utilisation of the equipment.
- AGLL: two weeks in one mission. The mission will take place at project start-up to assist in identifying appropriate land management techniques and in soil analysis.

2. Official Travel

To cover in-country travels of the project consultants and national staff assigned to the project.

3. Contracts (Details in Annex 1)

- Contract with a local institute/organization for the provision of farm survey and monitoring selected climatic and soil parameters (ToRs in Annex 1.2): up to US\$5 000.

- Contract with an international institute operating in the country (ICARDA) for the preparation of training manual for CA and the provision of specific technical inputs to the implementation of the project training and field activities (ToRs in Annex 1.1): up to US\$40 000.

4. General Operating Expenses

To cover miscellaneous expenses required for operating the project in the country (office stationary and consumables, telephone, photocopy paper, fuel, etc.). The cost for editing and printing the CA manual are also budgeted under this line (for up to US\$5 000).

5. Materials and Supplies (Details in Annex 4)

For training materials and field inputs/working materials (agrochemical, seeds)

6. Equipment (Details in Annex 4)

For mechanized conservation tillage equipment, weed control, one vehicle, computer and peripherals, etc.

7. Direct Operating Cost

To cover miscellaneous expenses at FAO-HQ related to the implementation of the project (7 percent of the project total expenditures).

8. Training

Awareness creation

- One two-day workshops: policymakers and staff from the MAWR, participating farmers and researchers (some 40 participants) will be invited to discuss the project-concept and the project work plan. The workshop will be organized by the National Project Coordinator and assisted by the Project Experts. *Estimated overall cost: US\$4 000 to support travel/allowance for outside-participants, renting room, training material and miscellaneous expenses.*
- Throughout the cropping seasons, at least three field days/visits will be organized for the same participants. *Estimated overall cost: US\$6 000 (three field days x two seasons x \$ 1 000 per field day).*

Formal training courses

- Two-day training courses each year will be organized, each for some 20 participating farmers and around ten researchers/technicians. The courses will be held by the local experts of the project and will address concepts of improved community water management, technical aspects of land and crop management under CA as well as participatory research and extension methodology. *Estimated cost: US\$5 000 (four courses x US\$1 250 per course) for participation/travel/transport of trainees and training material.*

Field training

- All on-farm training will be carried out within the Water User Associations (WUA). Throughout the project duration the local CA-experts will accompany the project farmers in a joint learning

process and develop and adapt the CA technologies together with the farmers. There will be regular on-farm training sessions and field demonstrations to which farmers, extension staff and MAWR staff will be invited. Neighbouring farming communities will be encouraged to participate in observing the field tests so as to initiate a farmer-to-farmer extension and exchange. *Estimated overall cost: US\$6 000 to support participation/travel of outside participants/extensionists and neighbouring farmers and miscellaneous expenses.*

Wrap-up workshop/Follow-up preparation

- A final workshop for the main stakeholders and donors (some 40 participants) will be organized towards project termination with the objective to outline possible follow-up activities. *Estimated overall cost: US\$3 000 to support travel/allowance for outside-participants, renting room, training material and miscellaneous.*

Study tour

- During the first planting season, two selected local CA specialists (one mechanization and one cropping systems specialist) will undertake a four-week study tour to Mexico to learn about permanent bed planting technology, which is the CA-technology under irrigated conditions promoted by the project. *Estimated overall cost: US\$11 400 (BL 5 694) to cover travel US\$3 000 and lumpsum (US\$2 700) for each participant plus US\$2 000 (BL5 920) for host organizer and miscellaneous*

(The amounts indicated above are intended to facilitate the organisation of the training events and the participation of the target trainees, according to FAO rules and regulations. If needed and appropriate, a local organization could be contracted to manage all training-related arrangements.)

VII. REPORTING

Within three months of the project's start, ICARDA will prepare an inception report to be approved by the Steering Committee for submission to FAO and MAWR/GOU providing an initial agricultural assessment of the selected pilot area in terms of the existing situation: individual farm resources, current farming practices (including livestock), arrangements for water distribution, the condition of irrigation infrastructure (including drainage), and a summary of the main constraints and opportunities.

During project implementation, ICARDA consulting Steering Committee will produce quarterly progress reports to include information on: procurement, completed project activities to MAWR/GOU institutional strengthening (WUA formation and farmer and technician training), and revisions to work plans. These quarterly progress reports will highlight difficulties encountered and proposals for their resolution.

At the end of the project, ICARDA will prepare a final completion report to be approved by the Steering Committee for submission to FAO and MAWR/GOU describing the outcome of the project in terms of impact, relevance, sustainability and suitability for replication. The final report will summarize the main conclusions and recommendations, and indicate whether the project has played a catalytic role in demonstrating the viability of changing agricultural practices (and policy) in the region.

In addition to these periodic reporting requirements, all consultants, including FAO personnel providing advisory technical services, will prepare mission reports containing their main conclusions and recommendations.

At the end of the project, a project Terminal Statement will be finalised by the FAO Lead Technical Unit, in accordance with TCP procedures, and submitted to GOU.

VIII. GOVERNMENT CONTRIBUTION AND SUPPORTING ARRANGEMENTS

The Government of Uzbekistan, through the Ministry of Agriculture and Water Resources (MAWR) will be responsible for the project execution. To this effect, MAWR will appoint a full time National Project Coordinator from MAWR/KK to coordinate and ensure smooth running of the project implementation and liaise with the Government (Terms of Reference in Annex 7). MAWR will continue paying the salary and emoluments to the National Coordinator during his/her assignment to the project.

For the purpose of overseeing and guiding project implementation, the MAWR will appoint a Steering Committee drawn from the relevant Ministry Departments, MAWR of Karakalpakstan, USPCA, Scientific Research Institute of Irrigation (SANIIRI) and ICARDA. The committee would meet as and when required but at least once per quarter.

MAWR will ensure the assignment of the required technicians and field staff to participate in the project activities and will continue paying their salaries and normal honoraria during their work on the project and participation in the training activities.

In addition, the Government will:

- Provide office accommodation in the project area;
- Grant exemption from the payment of all custom duties or other taxes for the importation of the project equipment and materials, also ensuring all the administrative arrangements for customs clearance and tax-free local purchase of project equipment and supplies;
- Grant prompt issuance, free of charge, of any visa or permits required for the project experts;
- Assist in the organization of the training course; provide venue and training equipment beyond the provision of the project;
- Provide support staff, such as secretarial assistance and field labour, as and when needed and local transportation beyond the provision of the project.

After the project, the Government will take all necessary action to support the larger application of the agricultural practices demonstrated by the project, in line with the project recommendations, also facilitating the required arrangements for donors' support to the above.

The participation and obligations of the Government are also outlined in the text of the General Provisions, which is attached to and is an integral part of this project agreement (Annex 8).

PROJECT BUDGET
(FAO contribution in US dollars)

Country: Uzbekistan
Project Number: TCP/UZB/2903 (A)
Project Title: Sustainable agriculture practices in the drought-affected region of Karakalpakstan

Comp.	Component Description	Sub Comps.	Main Comp.
5013	Consultants		33,000
5543	Consultants - National	33,000	
5014	Contracts		45,000
5650	Contracts Budget	45,000	
5020	Overtime		11,000
5652	Casual Labour - Temporary Assistance	11,000	
5021	Travel		54,040
5661	Duty travel others	12,000	
5694	Travel - Training	11,400	
5692	Travel ATS	30,640	
5023	Training		26,000
5920	Training Budget	26,000	
5024	Expendable Equipment		22,500
6000	Expendable Equipment	22,500	
5025	Non Expendable Equipment		71,500
6100	Non Expendable Equipment Budget	71,500	
5027	Technical Support Services		63,456
6111	Report Costs	1,000	
6116	Evaluation	1,000	
6120	Honorarium ATS	52,640	
6122	Standard Supervisory Technical Services	7,500	
6123	Supervisory Functions of LTU	1,316	
5028	General Operating Expenses		16,495
6300	General Operating Expenses Budget	16,495	
5029	Support Cost		24,009
6118	Direct Operating Costs	24,009	
	Grand Total		367,000

Annex 1.1

**Contract for the Provision of Technical Services in Project Implementation (ICARDA)
Terms of Reference**

ICARDA, committed to the development and promotion of sustainable practices in the region, will be a partner in the implementation of the project. ICARDA office will be contracted by FAO to provide the technical inputs that are further described below. It will also facilitate the day-to-day management and monitoring of the project. This is particularly important in a country where FAO does not yet have a Representation. ICARDA will also make available to the project the results of its research efforts in sustainable agricultural practices in Uzbekistan.

The main benefits/synergies for the TCP project through ICARDA involvement are:

- Close linkages in Uzbekistan with the stakeholders: MOA, farmers, research community.
- Work initiated on zero tillage and the need to transfer the results and experience/knowledge on farms.
- Fully operational office in Uzbekistan
- ICARDA staff member from Uzbekistan capable of leading the project team.

Under the overall supervision of the FAO Office for Europe and the technical supervision of AGPC, AGST, AGLW, and AGLL and in agreement with the MAWR, ICARDA will provide the following services under this contract:

- Technical in-country guidance of the project activities, in coordination with and under the supervision of FAO and Steering Committee and competent local institutes and local agencies, including the Scientific Research Institute of Irrigation (SANIIRI) and the Tashkent Institute of Irrigation and Agricultural Mechanization Engineers (TIAME).
- ICARDA will appoint a counterpart for the project (Project Leader) who will communicate with FAO, MAWR and the National Project Coordinator and take responsibility for the day-to-day activities of the project;
- Facilitate logistical and operational support for FAO experts visiting Uzbekistan in the framework of the project, in close consultation with REU, AGPC and UNDP;
- Timely reporting of the project results and routine communication with FAO and MAWR;
- Technical guidance of the project on the selection of crop varieties for the project, seed sources and quality control;
- Project linkages to other international centres (CGIAR, CIMMYT, ISNAR and IWMI) advanced research institutions; private companies (Monsanto) and research establishments in the region. These organizations can provide knowledge, seed or other products, or become partners in expansion of the pilot project initiatives and results to other areas in KK, Uzbekistan and in the region;

- Technical and organizational inputs concerning the greater involvement of farmers in the operation, management and maintenance of the irrigation system within the selected hydraulic unit; this would involve the formation and strengthening of a Water Users' Association (WUA), including: formal establishment, hiring relevant staff (accountant, hydro technicians, etc), introduction of an irrigation service fee, establishment of an operation and maintenance plan.
- drafting the main features of an outline programme for follow-up interventions by interested donors
- Lead on-farm training within the Water User Associations (WUA), on-farm training sessions and field demonstrations
- Encourage, with the support of the national consultants, neighbouring farming communities' participation as observer in the field tests so as to initiate a farmer-to-farmer extension and exchange. Conditions for the agreement and details of the work plan will be elaborated during the start-up mission of the FAO technical advisory team

In collaboration with FAO technical units and the Steering Committee ICARDA will:

- Prepare and update on a regular basis a detailed work plan for implementation of the project.
- Oversee the selection of appropriate cropping systems, cover crops and soil and weed management technologies for conservation agriculture and in the introduction and participatory testing of the technologies in the pilot areas using demonstrations.
- Ensure the correct and timely execution of the project activities including coordinating the missions of project experts and national project staff to ensure timely provision of expertise for participatory diagnostic, training, demonstrations, extension and evaluation;
- Provide technical guidance to the work of the national agency(ies), entrusted the implementation of farm surveys and farm mechanization, in line with their specific terms of reference;
- Oversee the design, organization and execution of the final wrap-up project workshop with a view to developing a possible follow up programme;
- Prepare in close consultation with the Project National coordinator, a mid term and final report, describing the establishment of the pilot activities with farmers, activities undertaken, results, observations, conclusions and recommendations.

Annex 1.2

Contract for the Provision of Farm Survey and Monitoring of Climatic and Soil Parameters (Local Agency) Terms of Reference

In agreement with the MAWR, a local agricultural institution will be engaged into a contractual agreement with FAO to provide relevant services in the implementation of a farm survey and assistance in the introduction of relevant farm machinery. The contractee will be responsible for the following tasks:

- To carry out a baseline survey on the present farming conditions of the selected pilot farm related to present cropping pattern, production of main crops, and agricultural inputs used (seeds, fertilizers, pesticides);

- To inventorize farm machinery and equipment, their working conditions and prepare a costed proposal to repair and upgrade existing farm machinery and equipment;
- To prepare a detailed proposal of relevant farm machinery and equipment to be introduced and tested for improved land-cultivation, water conservation and farm operations and prepare detailed specification for the procurement of the machinery and equipment inside and outside the country;
- To carry out an inventory of the present irrigation infra-structure, on-farm irrigation conditions and irrigation water supply and prepare a proposal for upgrading of the on-farm irrigation conditions and improved land levelling and land shaping (furrowers, ditchers and bounding equipment), technology of irrigation, water accounting;
- To assist in the introduction of the improved farm machinery and train farmers in the use and maintenance of the equipment;
- To prepare relevant technical progress reports on the findings of the farm surveys and the impact and economic viability of the different equipment.
- Monitor soil moisture and salinity levels on demonstration and conventionally cultivated plots.
- Inspect chemically-treated plots and weed/crop regrowth.
- Monitor crop development and harvest.

Agricultural Concepts for the TCP Project

Pilot Farm

The following parameters for the proposed project are recommended:

- an area of 500 hectares of uniform agricultural land in one hydraulic unit² to be identified for the pilot farm;
- if possible, a former rice growing area should be selected so that survey and soil testing work can be reduced to ensure timely project start-up; if not, the identified block will require soil testing to determine nutrient and salinity status at the commencement of the project. Any corrections will need to be made immediately because the soil, as the most vital component for farmers' operations, must be in optimum condition. This might involve the rehabilitation and improvement of the system of field drainage to control water table levels, field levelling;
- 20 private family farms with roughly equal-sized holdings to be established within this selected block – equal-sized holdings are important for the smooth introduction and replication of new crops and technologies;
- continued use of the centralized machinery pool for most traditional operations;
- wheat will continue to be grown on the farms involved in the pilot project utilizing existing field and harvesting machinery, which has been modified for use under CA conditions;
- reduced tillage technology, including direct drilling to be introduced, none or surface incorporation of crop residues, cover crops, etc. FAO and ICARDA have considerable knowledge and experience of this technology. It will contribute to reduced soil moisture losses (evaporation and leaching), fewer tractor operations, reduced costs and gradually increasing yields;
- crop diversification into more drought and salt tolerant crops to be gradually introduced. Crops to be considered are: sunflower, soybeans, sesame, safflower, sorghum, millet, maize, lentils, chickpeas, beans, lucerne, vegetable crops, forage and fodder crops;
- improvement of crop rotations, including double cropping: this will lead to improved sustainability of cropping systems. Grain and fodder legumes, by their nitrogen fixing ability, can benefit the soil by 50 kg of nitrogen per hectare per year, as well as aerating the soil profile;
- soil fertility management: this will be achieved by a reduction in soil degradation and improvement of soil structure, by the adoption of reduced tillage principles and careful incorporation of farmyard manure to boost humus and organic matter levels in the soil;

² Ideally an irrigated sub-unit (one on-farm canal) within the boundaries of a former large farm (Shirkhat).

- sustainable systems, which include livestock, are to be developed. Livestock production is under siege as a result of the inadequate availability and poor distribution of drinking water, shortage of good quality grazing and conserved fodder and lack of veterinary supplies. Livestock are an important part of rural life in KK and as conditions become more arid will increasingly play a more important role in peoples' livelihoods. The cultivation of forage and fodder crops by the project farmers will encourage livestock production and lead to more sustainable systems of farming;
- provision of farm inputs including good quality seed of well adapted varieties of the crops selected will be supplied, together with minor quantities of specialized fertilizers unavailable locally, such as gypsum for soil salinity amelioration, which will be financed by the project;
- farm machinery for the planting and harvesting of new crops - reduced tillage equipment is not currently available on farms, so the pilot farm will modify existing seed planters/drills and combine harvesters into CA equipment; training for technicians and farmer group (WUA) in the new crops and technologies being introduced with the project;
- marketing and processing information to be developed and expanded to assist the farmers on the project;
- crop water requirement comparisons between former/existing farming system and proposed new diversified crop system to be calculated, and
- crop budget comparisons and detailed cost / benefit analysis to be carried out

Cropping Plan

	2004		2005	
	Area Planted (ha)		Area Planted (ha)	
	Summer	Winter	Summer	Winter
Wheat		300		300
Barley		150		150
Rape-seed		50		50
Sunflower	150		150	
Soya Bean	150		150	
Sorghum	50		40	
Maize	50		40	
Lucerne	100		(100)	
Forage Mix			15	
Vegetable crops			5	

The first year (2004) will be used to introduce some of the new crops and technologies to the project farmers during the irrigation season. They will be adjusting to the concept of being independent private farmers and will need time to settle into their new role with different crops and technologies. Cropping intensity will be reduced during this first year to allow for this process, and for the tight

schedule to be adhered to. After the summer crops of sunflower and soybean, winter wheat will follow in rotation on the same land; there is adequate time following harvest to direct drill the wheat crop.

During the second year, some additional crops will be tested for their suitability, and possible inclusion in the rotation.

Work Plan

A detailed work plan will be prepared at project inception with the support of the AGPC Officer and ICARDA

First Project Year (August 2003-July 2004)

- award contracts to ICARDA and local consultants
- engage local scientists for monitoring agricultural and economic parameters of the demonstrations
- finalize list of equipment and supplies
- organize inception workshop to discuss detailed work plan
- establish the project office at Nukus
- select the participating farms
- order needed equipment and parts
- order needed seed, herbicide and fertilizer
- survey selected farms
- training workshop on improved water, land and crop management
- modify existing machinery/equipment for the use under Conservation Agriculture
- soil analysis
- supervise improved land preparation and direct seeding
- setting-up and training of water user association
- carry out monthly on-farm training on water and crop management
- carry out bi-monthly field days
- monitor growing conditions of crops on both demonstration and control plots
- modify the combine harvester with straw chopper
- mid-term review
- review workshop and draw-up work plans for 2001

Second Project Year (August 2004-July 2005)

- continuation of the activities from the previous year
- farmer training programme and field days
- monitor soil physical parameters, crop and weed growth on both demonstration and control plots
- project evaluation by independent local institution
- final workshop to assess overall result of the project activities and define follow-up
- prepare draft guideline on improved water, land and crop management
- terminal report and terminal statement

Itemized Costs

Under the project existing farm machinery will be converted as far as possible to work under no-till conditions for direct planting. Also, existing irrigation technology and water accounting will be improved. In addition, a range of equipment and update kits will be provided to introduce new technologies.

1. Equipment

Items	Units	Unit Cost US\$	TotalUS\$
Boom sprayer update kits	5	2,000	10,000
No-till planter-cum-seed drill	1	4,000	4,000
Small direct seeding grain drill (India/Pakistan)	5	500	2,500
Semi-manual direct hort. transplanter units for tractor (Brazil)	1	5,000	5,000
Walking type strip tiller (China)	2	2,000	4,000
Straw choppers	5	3,000	15,000
Bed planters	3	1,000	3,000
Land graders	2	1,500	3,000
Ditchers	2	1,500	3,000
Drip irrigation (1 ha)	1	5,000	5,000
Water accounting device	1	5,000	5,000
Minibus (UAZ)	1	8,000	8,000
Desktop	1	2,000	2,000
Printer	1	1,000	1,000
Digitalcamera	1	1,000	1,000
Total			71,500

2. Materials and Supplies

Item	Units	UnitCost US\$	Total US\$
Seed	15 tons	500	7,500
Non-selective herbicide	2,500 litres	2,500	15,000
Total			22,500

**Advisory Technical Services (ATS)
Terms of Reference**

The FAO Technical Advisory Services will be provided through a number field missions and close monitoring of progress report and mission reports. The terms of reference of the Advisory Technical Services will include:

1. AGPC: Crop management and Lead Technical Unit (LTU): (Total of six weeks in three missions)

Advisory services on the introduction of appropriate farm operations and agricultural practices, selection of crop rotations and cover crops and optimizing livestock and agro-forestry interactions and resource use efficiency. Overall coordination of the implementation of the project. Three missions will be effectuated in close coordination with the national project staff for a total of six weeks.

First mission (two weeks at start of the project):

- Review of the farming system, crop productivity and crop cultural operations with adequate attention to inputs, labour and agricultural services.
- Advise on the TOR for on the implementation of a baseline study and selection competent national agency to implement the study;
- Advise selection and establishment of appropriate crops and cropping systems and specification of selection and procurement of seeds and agricultural inputs;
- Advise on appropriate conservation practices and suitable farming practices to be implemented and proposals for the implementation of the demonstration fields,
- Guidance on the preparation of the work plan and definition of the implementation arrangements with National Project Leader and contractual agreement with ICARDA;
- Advise on the implementation of a training programme for farmers in integrated crop management techniques;
- Asses local capacity of seed production and distribution of crops used in the project; and
- Provide a mission report.

Second mission (two weeks): (At the end of the first season):

- Review overall progress of the project and evaluation of the results of the demonstration programme and introduction of the improved cropping system ;
- Assist Project Leader and ICARDA in the preparation and implementation of the mid-term review;
- Advise on problems encountered with new technologies;
- Provide guidance in the preparation of the work plan for the next season; and
- Provide a mission report.

Third mission (two weeks): (towards the end of the project):

- Carry out a field survey together on the adoption of demonstrated technologies in crop management and analyze the advantages and constraints encountered by farmers;
- Assess potential and provide guidance for future development;

- Provide a concise survey report with results, conclusions and recommendations;
- Contribute to the eventual formulation of a national conservation agriculture policy and follow up programme.

2. AGLW: Irrigation drainage infrastructure, irrigation water management and salinity control: (total of four weeks in two missions):

Advisory services on the introduction of efficient water use practices and improved on-farm irrigation technologies, including recommendations on salinity and drainage control.

First mission (two weeks - at start-up of the project):

- review of the irrigation system and on-farm irrigation practices and assessment of salinity and drainage conditions.
- analysis of crop water requirements and efficiency of actual water supply conditions and field irrigation methods;
- recommendations on the introduction of improved irrigation practices (irrigation scheduling), efficient irrigation methods and options to reduce water use through conservation practices and deficit irrigation
- advise of land levelling and improved field water control through appropriate farm equipment
- advise on appropriate measures for salinity and drainage control, soil leaching and linkages with FAO regional programmes on drainage;
- advise on improved cooperation among farmers in operation and maintenance of the irrigation system and institutional strengthening of the water users association;
- advise on the implementation of a training programme and identification of suitable agency to assist in the implementation of the training;
- elaboration of work plan with competent national agency and supervision by ICARDA and advise on irrigation monitoring programme and salinity control,
- establish cooperation with the Scientific Research Institute of Irrigation (SANIIRI) and linkages with relevant national and regional irrigation and water conservation programmes;
- preparation of mission report.

Second mission (two weeks after first season):

- review of the impact of the improved irrigation techniques and recommendations on water conservation practices
- recommendations to overcome constraints and enhance project results;
- update of the work plan and training programme for the second season;
- preparation of mission report with recommendations on follow-up programme.

3. AGST: Agricultural Engineering : (total of four weeks in two missions):

The Agricultural Engineer (AGST) will, in coordination with the national project coordinator, the LTU and the other technical units involved provide guidance and monitoring for aspects related to equipment choices for Conservation Agriculture, particularly planting, spraying and residue management technologies. The first mission should coincide or overlap with the first mission of the TCDC expert on machinery conversion and with the officers from the other technical HQ services.

The backstopping will comprise two missions, during which the officer will:

First mission (total two weeks at the initial period of the project):

- Assess existing equipment and necessary adaptations for it to be used in agricultural systems using direct planting with residue cover in relation to the proposed crop rotations
- assess local capacities for applying modifications and prepare procurement lists for conversion kits or new equipment
- identify and advise on the nature of modifications (for example sprayer update kits, planter modifications)
- prepare a report on necessary equipment modifications and technology proposals.

Second mission (two weeks at mid-term):

- assess the equipment modifications
- advise on eventual problems encountered and further adaptations if necessary
- advise on use and user training
- prepare a report
- analyze the experience with the modified technologies
- assess potential and provide guidance for future development
- contribute to the final report

The Agricultural Engineer (AGST) will, in coordination with the national project coordinator, the LTU and the other technical units involved provide guidance and monitoring for aspects related to equipment choices for Conservation Agriculture, particularly planting, spraying and residue management technologies. The first mission should coincide or overlap with the first mission of the TCDC expert on machinery conversion and with the officers from the other technical HQ services.

4. AGLL: Soil Management : (total of 2 weeks in 1 mission):

Technical will include advice on the selection of techniques for demonstrating integrated soil management including soil physical characteristics, moisture, soil biology and plant nutrients, as well as wider environmental issues. This will include Land Degradation Assessment (LADA) and advice on survey and soil testing to evaluate nutrient and salinity status.

Mission (two weeks - implemented in the course of the first year of the project): the following tasks will be carried out:

- Advise on soil productivity improvement with particular focus on: Assessment of the extent and degree of land degradation using the LADA approach;
- Management practices to enhance soil physical conditions (structure and moisture), plant nutrients and soil biological activity;
- Effect of the conservation agriculture system on soil and water and land management (including soil salinity management);
- Assistance of staff in the selection with farmers of best soil management practices for specific crop-livestock systems and in training in their use;
- Support in the monitoring and evaluation of impacts on soil and water quality and land management in the pilot area;
- Contribute to the eventual formulation of a national conservation agriculture policy and follow up programme.

**National Consultants
Terms of Reference**

1. National Consultant in Land and Water Management (six months in two missions: three months in each year as required)

Under the overall supervision of the FAO Regional Office for Europe and technical supervision of the Water management Service (AGLW), and in close collaboration with the Crop and Grassland Service (AGPC), Land and Plant Nutrient Management Service (AGLL), the Agricultural Engineering Service (AGST), the UNDP Representation, ICARDA, and the National Project Coordinator, the National Consultant will:

1. Prepare, in close collaboration with ICARDA, the detailed work plan of the project.
2. Provide improvement of irrigation drainage infrastructure, improve soil levelling, irrigation technology, soil leaching, adoption water accounting devices and facilities.
3. Oversee the selection of appropriate cropping systems, cover crops and soil and weed management technologies for conservation agriculture and in the introduction and participatory testing of the technologies in the pilot areas using demonstrations.
4. Ensure the correct and timely execution of the project activities including coordinating the missions of project experts and national project staff to ensure timely provision of expertise for participatory diagnostic, training, demonstrations, extension and evaluation.
5. Follow up in Scientific Production Centre SANIIRI, ICARDA and other relevant bodies the formulation and eventual implementation of respective policies and ensure that necessary follow up activities are put in place.
6. Oversee the design, organization and execution of the final wrap-up project workshop with a view to developing a possible follow up programme.
7. Prepare in close consultation with the Agricultural Training Expert, a mid term and final report, describing the establishment of the pilot activities with farmers, activities undertaken, results, observations, conclusions and recommendations (taking into account TCP Guidelines).

Qualifications:

- be able to communicate and report (verbal and written) in English
- have good project management skills
- have a professional background in agronomy and/or soil science, or related subjects with working experience in sustainable soil, water and crop management.

2. National Consultant in Conservation Agriculture and Cropping Systems (ten months in two missions)

Under the overall supervision of the FAO Regional Office for Europe and technical supervision of AGPC and in close collaboration with the National Project Coordinator, the National Consultant will have the overall responsibility for the selection and implementation of the technical concept of sustainable practices in the project. This task shall require ten months, five in PY 1, and five in PY 2 of work in the field throughout the entire period of fallow management and wheat growing during two

successive years. The specific work requirements comprise the following:

- Determination of appropriate diversified cropping systems based on CA.
- Selection of appropriate equipment and inputs for the envisaged cropping systems and agro-ecological situations.
- Provide needed local knowledge of spraying technology (both aerial and ground-based), weed identification, crop growth responses, wheat variety identification etc.
- Initiate test/validation field programme with selected crops and CA-technologies.
- Suggest suitable systems for crop residue and snow management.
- Organizing the open field days at critical times.
- Check the field operational histories of both the demonstration and the related control plots and ensure that like is matched with like when the results of the entire demonstration over all farms in the demonstration set are finally analyzed.
- Liaise with and coordinate the specialists in the task of monitoring the soil, crop and climatic parameters.
- Carefully observe at first hand the operation and performance of all machinery and implements used on the demonstration area and associated control plots, noting any possible modifications that might be made to this equipment in subsequent years.
- Frequently inspect the demonstration areas on each farm, checking that each farm management is observing their obligations not to take any action outside the mutually agreed contract drawn up according to the demonstration design.
- Liaise with participating farm management and the relevant specialists in making joint decisions on the most appropriate actions for securing control of secondary weed growth emerging after the first main herbicide application.
- Participation in the training programme of the project
- Assistance in the development of the training manual.
- Collaboration in the reporting of the national project team.
- In the second year supervise seed quality along with pre-planting operations and seeding operations using the locally modified farm machinery.
- Also in the second year, advice on application of the selective 2-4 D herbicide applied to the growing crop.
- Assist in crop cutting.
- Assist in securing full monitoring by the relevant monitoring specialists of each of the physical parameters at the precise times set out in the demonstration design.
- Keep detailed log books for each demonstration plot and sub-plot on participating farms and make this available for inspection by the PC, Mechanization Specialist during his regular short visits and by each participating farm management.
- Assist in the timely organization of the training programme and open field days at each demonstration site, ensuring as wide a coverage as possible.
- Produce concise progress reports at seasonal intervals setting out targets and performance, and proposing any needed modifications in the demonstration design during subsequent years, for consideration by the CA- Specialist (ATS).
- Preparation of the terminal statement at the end of the project.

Qualifications:

The local expert in CA and cropping systems should have:

- more than five years practical working experience in mechanized CA , preferably in the region
- have a professional background in agronomy, and engineering or related areas
- have English language skills
- have good communication skills for a participatory development process

3. National Consultant in Mechanization (four months in two missions)

Under the overall supervision of the FAO Regional Office for Europe and technical supervision of AGST and in close collaboration with the National Project Coordinator, the National Consultant will have the responsibility for the implementation of the mechanization aspects of the project. His/her assignment will have a total duration of four months to be executed in two field missions and should coincide with the training activities of the project.

His/her duties and responsibilities will be:

- Selection of appropriate locally available CA-equipment and machinery.
- Assess and advise on options of local improvements/modifications of equipment for the purpose of the project.
- Assess and advise on possibilities of local/regional manufacturing, adaptation of CA-equipment.
- Assess and advise on technical characteristics and options for improvements of spraying technology used in CA for herbicide application.
- Assist the participating farmers in the development and implementation of the CA-tillage cropping system.
- Collaboration in the reporting of the national project team.
- Participation in the training programme of the project.
- Assistance in the preparation of the training manual.

Qualifications:

The local expert in Farm Mechanization should have:

- more than five years practical working experience in mechanised CA-tillage farming, preferably in the region;
- a professional background in agronomy, engineering or related areas;
- English language skills.

4. National Consultant in Soil Management and Land (three months in two missions)

Under the overall supervision of the FAO Regional Office for Europe and technical supervision of AGLL and in close collaboration with the National Project Coordinator, the National Consultant will have the responsibility for the selection of techniques for demonstrating integrated soil management including soil physical characteristics, moisture, soil biology and plant nutrients, as well as wider

environmental issues. His/her assignment will have a total duration of three months to be executed in two field missions and should coincide with the training activities of the project.

His/her duties and responsibilities will be:

- Advise on soil productivity improvement with particular focus on: Assessment of the extent and degree of land degradation using the LADA approach;
- Management practices to enhance soil physical conditions (structure and moisture), plant nutrients and soil biological activity;
- Effect of the conservation agriculture system on soil and water and land management (including soil salinity management);
- Selection with farmers of best soil management practices for specific crop-livestock systems and in training in their use;
- Support in the monitoring and evaluation of impacts on soil and water quality and land management in the pilot area;
- Collaboration in the reporting of the national project team.
- Participation in the training programme of the project.
- Assistance in the preparation of the training manual.

Qualifications:

The local expert in Soil Management should have:

- more than five years practical working experience in conservation-effective soil management, preferably in the region
- a professional background in agronomy, soil science or related areas
- English language skills

5. National Consultant in Irrigation (ten months in two missions)

Under the overall supervision of the FAO Regional Office for Europe and technical supervision of AGLW and in close collaboration with the National Project Coordinator, the National Consultant will have the responsibility for the introduction of efficient water use practices and improved on-farm irrigation technologies, including recommendations on salinity and drainage control. His/her assignment will have a total duration of 10 months to be executed in two field missions and should coincide with the training activities of the project.

His/her duties and responsibilities will be:

- review of the irrigation system and on-farm irrigation practices and assessment of salinity and drainage conditions.
- analysis of crop water requirements and efficiency of actual water supply conditions and field irrigation methods;
- assistance on the introduction of improved irrigation practices (irrigation scheduling), efficient irrigation methods and options to reduce water use through conservation practices and deficit irrigation

- assistance of land levelling and improved field water control through appropriate farm equipment
- assistance on the implementation of a training programme and identification of suitable agency to assist in the implementation of the training;
- review of the impact of the improved irrigation techniques and recommendations on water conservation practices
- collaboration in the reporting of the national project team.
- participation in the training programme of the project.
- assistance in the preparation of the training manual.

Qualifications:

The local expert in Irrigation should:

- have more than five years practical working experience in Irrigation preferably in the region
- have a professional background in agronomy, soil science or related areas
- have English language skills

TERMS OF REFERENCE

National Project Coordinator
(Government contribution)

In close collaboration with the technical and operational units concerned in FAO and the National Project Coordinator will coordinate and supervise the implementation of the day-to-day activities in line with FAO rules and regulations for the implementation of projects. More specifically the incumbent will:

- liase between the relevant departments and ministries in the Government and the project staff (including the FAO consultants) to ensure the coordination and collaboration required for the implementation of the project;
- provide guidance and supervision to project staff to enable them to undertake the work required of the project and to ensure continuity between the work of the consultants and that of the local counterparts;
- ensure the timely provision of local inputs into the project, including infrastructure, transport, training facilities, information etc, as required;
- assist with the selection of candidates for the study tour and with the travel arrangements required;
- organize the implementation of and participate in the training programme, assist with the selection of candidates, teaching staff, curriculum development and provide guidance to the training team responsible of the training activities;
- produce quarterly technical progress reports and contribute to the preparation of the terminal statement.

GENERAL PROVISIONS

1. The achievement of the objectives set by the project shall be the joint responsibility of the government and FAO.
2. As part of its contribution to the project, the government shall agree to make available the requisite number of qualified national personnel and the buildings, training facilities, equipment, transport and other local services necessary for the implementation of the project.
3. The government shall assign authority for the project within the country to a government agency, which shall constitute the focal point for cooperation with FAO in the execution of the project, and which shall exercise the government's responsibility in this regard.
4. Project equipment, materials and supplies provided out of Technical Cooperation Programme funds shall normally become the property of the government immediately upon their arrival in the country, unless otherwise specified in the agreement. The government shall ensure that such equipment, materials and supplies are at all times available for use of the project and that adequate provision is made for their safe custody, maintenance and insurance. Vehicles remain the property of FAO, unless otherwise specified in the agreement.
5. Subject to any security provisions in force, the government shall furnish to FAO and to its personnel on the project, if any, such relevant reports, tapes, records and other data as may be required for the execution of the project.
6. The selection of FAO project personnel, of other persons performing services on behalf of FAO in connection with the project, and of trainees, shall be undertaken by FAO, after consultation with the government. In the interest of rapid project implementation, the government shall undertake to expedite to the maximum degree possible its procedures for the clearance of FAO personnel and other persons performing services on behalf of FAO and to dispense with, wherever possible, clearance for short-term FAO personnel.
7. The government shall apply to FAO, its property, funds and assets, and to its staff, the provisions of the Convention on the Privileges and Immunities of the Specialized Agencies. Except as otherwise agreed by the government and FAO in the Project Agreement, the government shall grant the same privileges and immunities contained in the Convention to all other persons performing services on behalf of FAO in connection with the execution of the project.
8. With a view to the rapid and efficient execution of the project, the government shall grant to FAO, its staff, and to all other persons performing services on behalf of FAO, the necessary facilities including:
 - i) the prompt issuance, free of charge, of any visas or permits required;

- ii) any permits necessary for the importation and, where appropriate, the subsequent exportation, of equipment, materials and supplies required for use in connection with the project and exemption from the payment of all customs duties or other levies or charges relating to such importation or exportation;
 - iii) exemption from the payment of any sales or other tax on local purchases of equipment, materials and supplies for use in connection with the project;
 - iv) payment of transport costs within the country, including handling, storage, insurance and all other related costs, with respect to equipment, materials or supplies for use in connection with the project;
 - v) the most favourable legal rate of exchange;
 - vi) assistance to FAO staff, to the extent possible, in obtaining suitable accommodation;
 - vii) any permits necessary for the importation of property belonging to and intended for the personal use of FAO staff or of other persons performing services on behalf of FAO, and for the subsequent exportation of such property;
 - viii) prompt customs clearance of the equipment, materials, supplies and property referred to in subparagraphs (ii) and (vii) above.
9. The Government shall deal with any claim which may be brought by third parties against FAO or its staff, or against any person performing services on behalf of FAO, and shall hold them harmless in respect of any claim or liability arising in connection with the project, unless the government and FAO should agree that the claim or liability arises from gross negligence or wilful misconduct on the part of the individuals mentioned above.
10. The persons performing services on behalf of FAO, referred to in paragraphs 6 to 9, shall include any organization, firm or other entity, which FAO may designate to take part in the execution of the project.