PF

カザフスタン共和国
ウズベキスタン共和国
トルクメニスタン共和国

プロジェクト・ファインディング調査報告書

カザフスタン共和国	アルマティ州農産物生産基盤・流通システム整備計画
	新首都近郊農業・農村開発計画
	コクサライ・ダム灌漑農業・環境改善計画
ウズベキスタン共和国	フェルガナ州排水改良・貧困地域農業振興計画
トルクメニスタン共和国	トルクメニスタン農業大学農業訓練センター設立計画
	農業情報センター設立計画

平成11年8月

社団法人　海外農業開発コンサルタンツ協会

カザフスタン共和国
ウズベキスタン共和国
トルクメニスタン共和国

プロジェクト・ファインディング調査報告書

カザフスタン共和国	アルマティ州農産物生産基盤・流通システム整備計画
	新首都近郊農業・農村開発計画
	コクサライ・ダム灌漑農業・環境改善計画
ウズベキスタン共和国	フェルガナ州排水改良・貧困地域農業振興計画
トルクメニスタン共和国	トルクメニスタン農業大学農業訓練センター設立計画
	農業情報センター設立計画

平成 11 年 8 月

社団法人　海外農業開発コンサルタンツ協会

まえがき

本報告書は、社団法人海外農業開発コンサルタンツ協会が派遣した富田俊宏（日本工営株式会社、国際事業本部）が、カザフスタン国、ウズベキスタン国およびトルクメニスタン国にて実施したプロジェクト・ファインディング調査結果に基づいて作成されたものである。

調査は平成 11 年 6 月 8 日から 7 月 6 日までの２９日間実施され、この間資料収集および相手国政府関係機関との協議を実施するとともに、現場調査を実施した。なお、調査実施対象案件は以下に示すとおりである。

(1) カザフスタン国
  (a) アルマティ州農産物生産基盤・流通システム整備計画
  (b) 首都近郊農業・農村開発計画
  (c) コクサライ・ダム灌漑農業・環境改善計画

(2) ウズベキスタン国
  (a) フェルガナ州排水改良・貧困地域農業振興計画

(3) トルクメニスタン国
  (a) トルクメニスタン農業大学農業訓練センター設立計画
  (b) 農業情報センター設立計画

これら案件の調査結果は次章に示してあり、また、調査団の調査行程、面会者リスト、現地写真および調査団長略歴はそれぞれ付属資料 1－4 に示すとおりである。

調査団は調査実施に際し、各国政府機関並びに日本大使館、国際協力事業団の現地事務所の方々に多大なる協力を得、円滑に業務を遂行することができた。これら関係諸機関に深甚なる感謝の意を表する次第である。

1999 年 8 月

プロジェクト・ファインディング調査団長

富田　俊宏

カザフスタン共和国
ウズベキスタン共和国
トルクメニスタン共和国

プロジェクト・ファインディング調査報告書

目次

頁

I. カザフスタン共和国

1. カザフスタンの概況

1.1 国土と人口

カザフスタン国は、北部および北西部はロシアと、南部はトルクメニスタン共和国、ウズベキスタン共和国およびキルギスタン共和国と、東部は中国と接しており、また、西部はカスピ海と接している内陸国である。国土面積は 2.72 百万 km^2 で、東西約 3,200 km、南北約 1,800 km に広がっている。

国家統計委員会が 1998 年に発行した統計書によれば、1998 年におけるカザフスタン国の人口は約 15.6 百万人で人口密度は 5.7 人/km^2 となっている。カザフスタン国の人口は 1993 年に 17.0 百万人で最高に達し、それ以後減少し続けている。1994 年から 1998 年に至る間の人口増加率は-1.2%である。人口減少の原因として、高死亡率と国外流出が挙げられる。なお、都市部と農村部の人口比率はそれぞれ 59%、41%となっている。

1.2 地勢

東部および南東部には天山、アラタウおよびアルタイなどの標高の高い山脈が連なっている。山岳地帯の面積は小さく、中央東部のカラガンダ付近には標高 800 ~ 1,000 m 程度の台地が見られるほか、山麓から西部はカスピ海、北部はロシアとの国境まで平地が広がる。西部はカスピ海沿岸低地、トウラン低地、北部は西シベリア低地などの平原である。

これら平地には山脈を水源とする何本かの河川が流れている。これらは、天山あるいはアラタウ山脈を水源とし南部の平原を流れアラル海に注ぐシルダリア河、南東部を流れバルハシ湖に流れ込むイリ河および南部の小湖水に流れ込むチュウ河、北西部と西部の平原を流れカスピ海に流れ込むウラル河とエンバ河などである。しかしながら、中央平原には大きな河川はない。

1.3 気候

カザフスタン国は半乾燥大陸性気候帯に属し、低温で乾燥した冬と高温で乾燥した夏によって特徴付けられる。年降水量は北部地帯の 150 mm から南部山岳地帯の 450 mm へと変化する。降水の型は地域により異なり、北部は夏型であり、ここでは年間降水量の 70%が作物の生育期間である 4 月から 10 月にかけて発生する。一方、南部では冬型であり、作物の播種期である 4 月および 5 月まで降水は多少見られるが、6 月以降 10 月までの降水は殆ど無い。

無霜期間は最大 200 日から最小 100 日の間にあり、北部および北東部で短く南部および西部に行くにつれて長くなる。年平均日照時間は平均 2,720 時間であるが、これは南部で大きく北部で小さい。作物の生育期間における（5 ~ 9 月）日照時間は非常に大きく、殆どの地域で 1 日当たり 8 ~ 10 時間である。

1.4　社会経済状況

1990 年のソ連邦解体に伴って従来の経済体制は完全に崩壊し、流通、経済システムにおける他の連邦共和国との経済的関係は断ち切られ、カザフスタンの生産力は一時期急速に低下したが、市場経済への移行を目指した包括的な構造改革を行った結果、1994 年以降緩やかではあるが後退期を抜け出そうとしており、1996 年における国民総生産の伸び率は 1.5%、また、1997 年には 3%が期待された。

旧ソ連邦時代の共和国分業体制の下では、豊富は地下資源とその半製品および穀物の供給基地の位置付けにあったことから、原料生産体制では世界規模の生産を有するものの、一般消費財の製造は国内需要の 20～30%に過ぎない。その産業構造は鉱工業部門の生産が NIP (Net Income Product)の 45%を占める最大の産業であり、農業部門が 37.3%でこれに次ぎ、両部門で全体の 80%以上を占めている。

貿易、特に輸出に占める農産物の割合は高い。鉱工業の輸出入のバランスは輸入超過であるのに対し農業のバランスは輸出超過である。農産物の輸出額は 1996 年で 2.1 億ドルで全輸出額(11.0 億ドル)の 19%を占めている。輸出先は 90.3%が旧ソ連邦である。

1.5　農業概況

長期間に亘り農業はカザフスタンの経済上重要な位置を占めてきた。1994 年には農業は国民総生産の 28%を占め、就業人口の 23%が農業に従事していた。国土の 75%すなわち 2 億 ha が耕地および牧野で、その大部分は家畜の放牧地として利用されている。耕地は 3,400 万 ha でそのうち 3,200 万 ha が天水畑、240 万 ha が灌漑農地である。穀物類が耕地面積の 62%を占め、残りは飼料作物と蔬菜類の栽培に使用されている。

大部分の生産農場で過去 5 年間に経済状態が悪化し、欠損を報告している生産農場は急激に増加している。損失は生産者価格が国際市場価格に比べて低く押さえられているのに対して、資材価格は農業資材価格の自由化政策によって高騰したことによる。このような状況下で、施肥量は減少し、燃料の不足により作付時期および収穫時期が遅れ、また、農機具の補充が困難になった。その結果、作付面積の減少ならびに収量の低下が起こり、作物の生産量は以下の表に示すように急減した。

(単位：千トン)

作物	1992	1993	1994	1995	1996
小麦	18,285	11,585	10,033	6,490	7,678
大麦	8,510	7,148	5,871	2,208	2,695
水稲	467	403	282	183	226
トウモロコシ	367	355	233	136	122
甜菜	1,160	843	433	341	371
ヒマワリ	122	86	97	99	64
棉	252	200	160	223	183
蔬菜類	3,842	3,286	2,967	2,498	2,436

1.6　農業開発政策

ソ連解体以来、農業生産は劇的に減少し、前節で述べたように特に最近 5 年間における低下は著しいものがある。政府は農業セクターの危機を憂慮し、①農産物価格と商業政策、②農産物の流通改革、③農業の私企業化と生産農場の構造改善、④生産力の向上、に重点を置いた政策を打ち出している。

農産物の価格が自由化されないのに対して、農業資材の価格が自由化されたことによる軋轢を解くために農産物価格ならびに通商の政策確立は急を要している。一方、市場の再編は、従来農業資材および農産物流通ならびに農産物加工の全部を掌握していた国営企業の私企業化、自由市場の導入、新規通商の奨励、農業資材供給業者ならびに農産加工業者の農業分野への参入の促進を目標としている。

国営企業の私企業化は 1996 年の初めまでにほぼ完了した。法制度環境が徐々に整備されつつあることから、新規業者の農産物流通部門への参入は容易になっている。既に畜産物、野菜および果実の加工ならびに流通分野では多くの私企業によってバイパスが作られている。一方、穀類の流通については、私企業が前国営企業と競合しているが、新しい流通経路の発展は殆ど見られない。

農業生産性の改良に関しては、農業研究と農業改良の普及が重要な役割を持つ。しかしながら、現在は農業改良普及組織はこの国には存在しない。農業セクターの私企業化が急速し進み、かつ近い将来個人農家が増加することを考えれば、農業改良普及組織の設立と農民の訓練計画の作成が必須うとなる。政府は農民の教育と訓練のため、農業省に農業改良普及組織の設立を勧めており、これと平行して農業研究組織も国および州レベルで科学アカデミーの下で再編されつつある。

2. アルマティ州農産物生産基盤・流通システム整備計画

2.1 計画の背景

アルマティ州はカザフスタン全土の約 1 割、総人口 2 割を占め、中央アジアではタシケントに次ぐ大きな都市圏を形成している。同地域は 1997 年までカザフスタンの首都であったアルマティ市への生鮮野菜、果実、食肉等の農産物供給基地として発展し、集約的かつ多様化が進んだ都市近郊型農業が国家発注体制および政府統制価格の下で営まれてきたが、1997 年以降はこの国家管理は廃止され、農民と仲買人との間での取引は自由になった。しかしながら、この改革は急激なものであったため、未だ法制度も含め効率的な流通システムの設立には至っておらず、仲買人が個々の農家を回り直接庭先で取引を行う形態が一般的となっている。取引に際しては、農家側には価格交渉の余地は殆ど無く、安い価格で買いたたかれている。このため、これら作物の生産に対して農家は意欲を無くしている。また、仲買人によって買われた農産物は市場に出され、その農産物を別な仲買人が買うというケースが多く、これが 3 ~ 4 段階を経て消費者にやっと渡るというケースが多く見られ、品質は低下し、また、30%以上のロスが生じていると言われている。

一方、アルマティ市の中央市場施設の老朽化と整備の立ち遅れが顕著になっている。施設の未整備に加えて、他の発展途上国と同様、このアルマティの中央市場においても、運営面での問題点も目に付く。卸売市場と小売市場が混在しており、卸売業者、小売業者による取引きに加えて、市場の駐車場内や施設の周辺で集荷業者が直接トラックの荷台を利用して直接消費者に農産物を販売する青空市場が展開されているのが現状である。また、市内に配備されている保冷倉庫も老朽化による施設の痛みが激しく、衛生的に見ても劣悪の状態である。

上記流通システムの不備に加えて、維持・管理不足に起因する農業生産基盤の荒廃もアルマティ市周辺農業の不振を引き起こしている原因となっている。このため、周辺地区からのアルマティ市に対する野菜、果物等の農産物の供給は不足しており、多量にウズベキスタンおよびキルギスタンより輸入しているのが現状である。

このような背景から、カザフスタン政府は我が国の援助により、アルマティ周辺における農産物流通上の問題点を解明し、生産基盤の改善および効率的な農産物流通システムの確立を強く望んでいる。

2.2 計画の概要

(1) 目的

本計画の目的は、カザフスタン国における野菜、果物を中心とした農産物の効率的な生産基盤および流通システムの構築にある。この目的を達成するための基本概念は以下のとおりである。

(a) 有効な土地利用、農業技術の改良、灌漑排水施設の改修・改善および圃場整備を行うことによる土地・水資源の有効利用を通して農業生産基盤を強化すること。

(b) 農産物価格の安定、地方流通基盤の整備、市場の開拓、市場組織の改善および法制度の整備を通して流通システムを強化すること。

(c) 農民に対する金融制度の開放、農業普及制度ならびに情報システムの設立および農民組織の強化を通して農業支援サービスを強化すること。

(2) 開発のコンポーネント

本計画におけるコンポーネントは概略以下のとおりである。

(a) 灌漑排水施設の改修改善、区画整理、農道網の整備等を含む農業生産基盤の改善

(b) 生産地における集出荷施設、選別施設、包装施設、保冷倉庫、管理事務所等の建設を含む流通システムの構築

(c) アルマティ市における既存中央市場の改善、積み込み/荷下ろし施設、重量測定施設、管理事務所等の設置および市場情報センターの設立

(d) 市場運営組織の改善および流通に関する法制度の整備

2.3 開発調査

(1) 調査対象地区

全国を対象に農産物流通システム改善に関するマスター・プランを作成し、この結果を踏まえて、アルマティ州全域を対象にフィージビリティ・スタディを行うこととする (図-I.1 参照)

(2) 調査内容および調査期間

「アルマティ州農産物生産基盤・流通システム整備計画」については、図-I.2 に示すとおり、まずフェーズ-I で農産物流通の問題点を解明し、農産物流通システム整備のための全国レベルでのマスター・プランを策定し、これを受けてフェーズ-II でアルマティ市州における農産物生産基盤の改善および流通システム整備計画のためのフィジビリティ・スタディを行うアプローチが妥当と考えられる。調査内容の概要を示せば以下のとおりである。

フェーズ-I： マスタープラン・スタディ

(a) 関連資料・情報の収集・分析

- 既存スタディ・レポート
- 国家および州農業開発計画
- 社会経済
- 農業統計
- 既存道路・鉄道網

(b) 現場調査

- 農産物の生産高ならびに流通システムおよび収穫後施設
- 対象裨益農家の識別および社会経済状況、生産圏、消費圏のゾーンニング
- 農産物の生産、販売における各分野の責任体制
- 既存農民組織および共同組合の活動状況
- 対象裨益農家に対する農業/財政支援体制
- 農業生産および市場に対する本事業のインパクト
- 政府組織の管理能力

(c) マスター・プラン策定

- 生産者および消費者の立場から見た市場の阻害要因の分析
- 市場・流通システム改善に伴う基本コンセプトの設定
- 事業の概略便益および費用の概算見積り
- 事業の経済性検討
- アルマティ市を含むアルマティ州における農業基盤および流通システムの整備計画の立案

フェーズ-II： フィージビリティ・スタディ

(a) 補足資料の収集

(b) 農業基盤施設、市場施設地点の測量および施設設計

(c) 農産物市場・流通システム改善計画の立案

- 産地集出荷システム計画
- 消費地販売システム計画

(d) 事業便益および費用の見積りならびに事業の妥当性検討

2.4 総合所見

(1) 本開発計画の特徴と意義

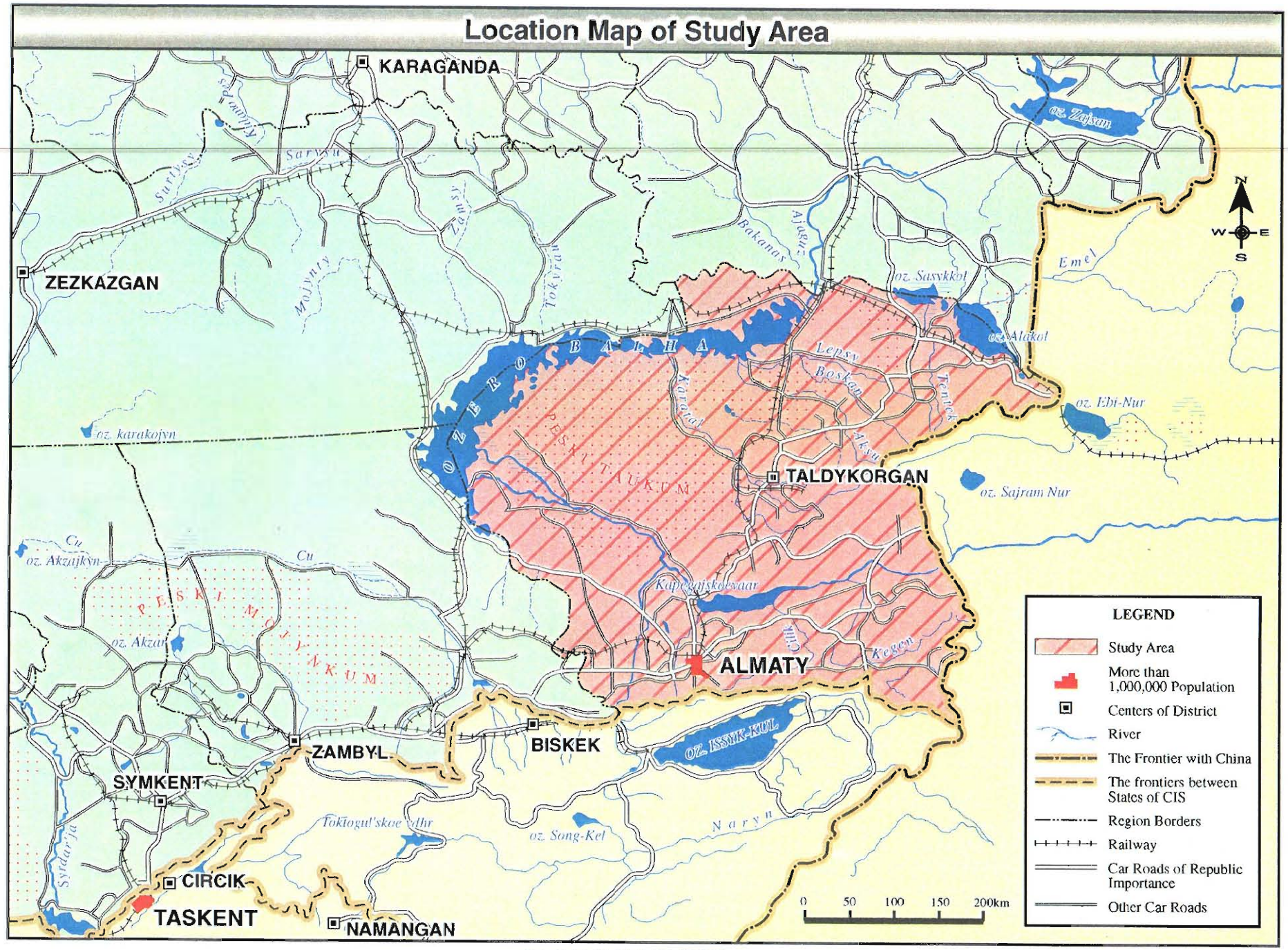
アルマティ市周辺地区は1997年までカザフスタンの首都であったアルマティ市への生鮮野菜、果実、食肉等の農産物供給基地として発展し、集約的かつ多様化が進んだ都市近郊型農業が国家発注体制および政府統制価格の下で営まれてきた。このため、自由経済に合致した農産物流通システムは発達する余地は無かった。しかしながら、自由経済システムに移行後は政府の援助は打ち切られ、流通システムは壊滅状態に陥り、仲買人が個々の農家を回り直接庭先で取引を行う形態が一般的となっている。取引に際しては、農家側には価格交渉の余地は殆ど無く、安い価格で買いたたかれているため、これら作物の生産に対して農家は意欲を無くしている。また、仲買人によって買われた農産物は市場に出され、その農産物を別な仲買人が買うというケースが多く、これが 3 ~ 4 段階を経て消費者にやっと渡るというケースが多く見られ、品質は低下し、また、30%以上のロスが生じていると言われている。

上記流通システムの不備に加えて、維持・管理不足に起因する農業生産基盤の荒廃もアルマティ市周辺農業の不振を引き起こしている原因となっている。

このような背景から、農業生産基盤の拡充、効率的流通システムの設立および法令・規則の見直しを行い、生産者側および消費者側の満足の行く農産物の売買が行われる必要がある。この観点から、本開発調査を通して問題点を指摘し、開発方針を提案することは意義がある。

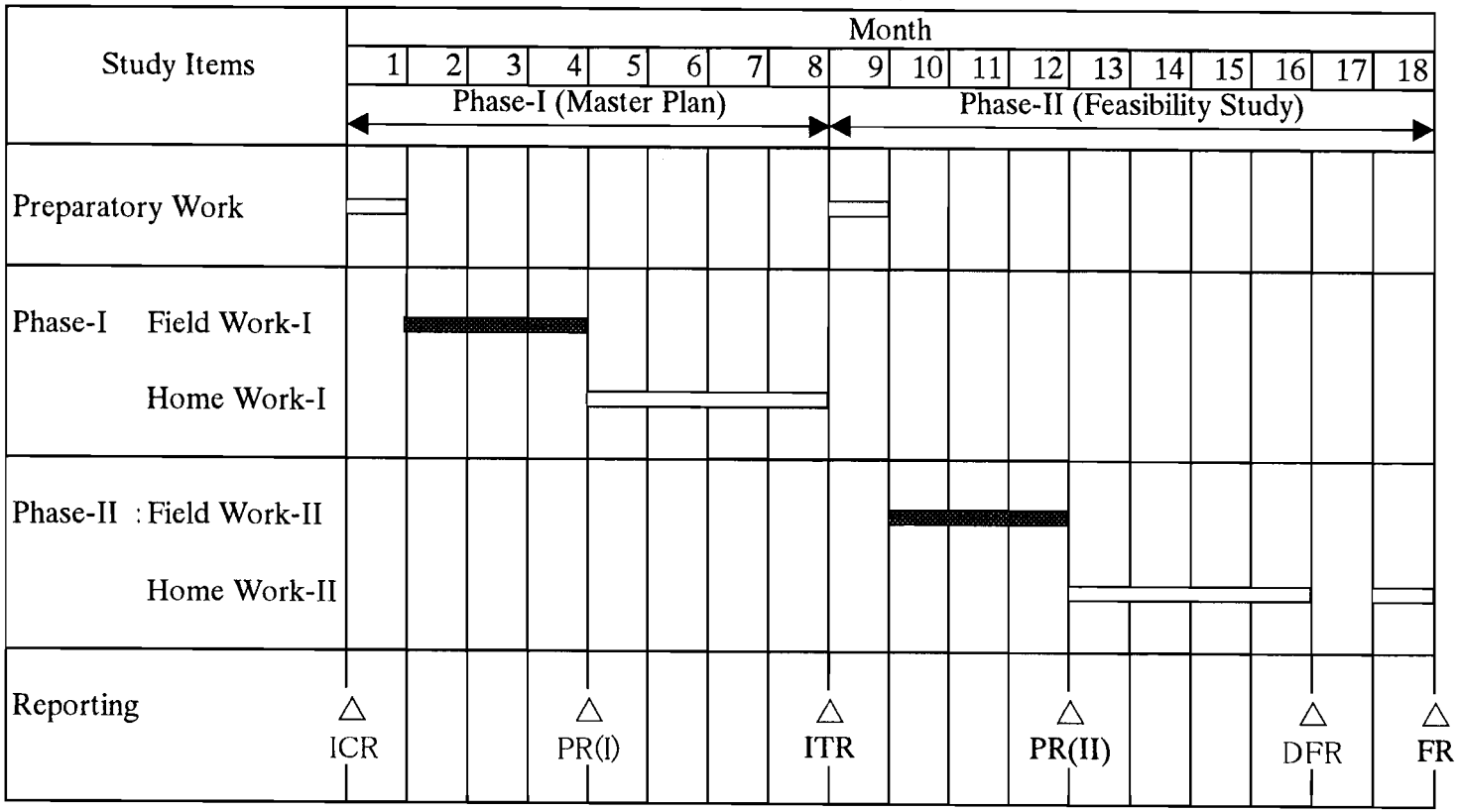
(2) 相手政府の意向

今回の調査時に面談したアルマティ市の農業担当副市長によれば、農産物流通システムは未発達であり、また、アルマティ中央市場には近隣農家が農産物販売のために使用出来るスペースも無く、市政府は止むを得ず、毎週土曜、日曜にアルマティ周辺の国道を閉鎖し農民に農産物販売の場として提供しているとのことであった。このため、生産地における集出荷組合の設立と施設の建設ならびに消費地の中央市場の拡張・近代化が急務であるとの認識を持っており、早期の事業実施を希望している。なお、この事業実施に対してはアルマティ市当局は日本政府の技術および資金援助を強く望んでおり、ADCA 調査団としても当事業を日本政府の優良なODA 案件として採り上げることが望ましいと判断する。



調査対象地区位置図

図1-1.1



Note:
- Work in Kazakstan
- Work in Japan

ICR : Inception Report
PR(1) : Progress Report (1)
ITR : Interim Report
RR(2) : Progress Report (2)
DFR : Draft Final Report
FR : Final Report

調査スケジュール（案）

3. 新首都近郊農業・農村開発計画

3.1 計画の背景

カザフスタン国は、1996 年にアルマティ市からアスタナ市への遷都に着手し、1998 年に完了した。新首都アスタナがあるアクモラ州はカザフスタン国の北部に位置する。州の全人口は 2.2 百万人である。なお、アスタナ市の人口は、遷都以前は 280,000 人であったが、その後急激に増え、現在では 400,000 人で、2005 年までには 500,000 人になると推定されている。

アクモラ州はカザフスタン有数の穀倉地帯であり、基幹作物は小麦、飼料作物などである。州全体の農地面積は 13.3 百万 ha で、このうち 5.6 百万 ha は耕作地であるが、僅か 48,500ha が灌漑されているに過ぎない。この州で栽培されている主な作物は、天水農地(3.3 百万 ha)で小麦および飼料作物、また、灌漑農地で野菜、ジャガイモ、トウモロコシ等である。しかしながら、これらの作物の収量は、灌漑排水施設の老朽化、不適切な農場管理、農業機械の老朽化、肥料投入量の低下等の理由によりかなり低い。因みに小麦の反収は 0.6ton/ha 程度に留まっている。

アスタナ市の発展に伴い、穀物の需要は増大し、農産物の多様化と高品質志向は急速に進んでいる。しかしながら、アスタナ市近郊における農業は上記阻害要因に加えて、強風（年平均：4.8 m/秒）による作物被害が大きく、需要サイドの変化に対応しきれぬ状況にある。また、今後益々需要が高まる野菜生産に不可欠な灌漑施設および流通施設は未整備の状態である。

地域経済の健全な発展を達成させるためには、伝統的な天水による畑作から、灌漑施設および防風林開発を中心に据えた農業生産基盤の構築および流通施設の整備が急務であり、首都圏型農業の導入が求められている。また、労働集約型の収益性が高い農業生産団地の形成は、近隣農村部からアスタナ市への労働力流入を抑制することにもなり、都市のスラム化による社会問題を未然に防ぐことにも寄与するものと期待される。

このような背景から、カザフスタン政府は我が国の援助により、アスタナ市およびその周辺3郡（Shortandy、Tselinograd、Arshaky）における「新首都近郊農業・農村開発計画」を実現したいとしており、その開発調査を日本の技術協力に期待している。

3.2 計画の概要

(1) 目的

本計画の目的は、新首都近郊の農業を振興し周辺農村部の開発を行うとともに、新首都に対する食料供給基地の構築にある。この目的を達成するための基本概念は以下のとおりである。

(a) 有効な土地利用、風災害の防止、農業技術の改良、および灌漑排水施設の改修・改善を行うことによる土地・水資源の有効利用を通して農業生産基盤を強化すること。

(b) 農産物価格の安定、首都近郊における流通基盤の整備、市場の開拓、市場組織の改善および法制度の整備を通して流通システムを強化すること。

(c) 農民に対する金融制度の開放、農業普及制度ならびに情報システムの設立および農民組織の強化を通して農業支援サービスを強化すること。

(2) 開発のコンポーネント

本開発計画におけるコンポーネントは概略以下のとおりである。

(a) 灌漑排水施設の改修改善、農道網の整備、防風林の建設等を含む農業生産基盤の改善

(b) 農村道、給水施設および下水施設を含む農村インフラの整備

(c) 生産地およびアスタナ市における農産物流通システムの構築

(d) 農業研究、農民金融、農業普及を含む農業支援組織の確立

(e) 農産物の集荷・販売、農業投入資材の購入、農業機械の貸し出し等を扱う農業協同組合の設立

(f) 効率的な水管理システムの構築

3.3 開発調査

(1) 調査対象地域

アクモラ州内ショルタンディ、チェリノグラッドおよびアルシャリ３郡全域を対象とする (図-I.3 参照)。

(2) 調査内容および調査期間

図-I.4 に示すとおり、本開発に関する調査は 3 フェーズに分けて行われ、フェーズ-I においてはアスタナ市およびその周辺３郡 (Shortandy、Tselinograd、Arshaky) の全域 1.75 百万 ha に含まれる 23,500ha の灌漑地区を対象にマスター・プランを作成する。フェーズ-II ではマスター・プランを通して選ばれた優先地区 3,000~5,000ha (図化面積：5,000~10,000ha) を対象に航空写真図化を行い、フェーズ-III ではマスター・プランを通して選定された優先地区を対象にフィージビリティ・スタディを行う。調査内容の概要を示せば以下のとおりである。

フェーズ-I： マスタープラン・スタディ

(a) 関連資料・情報の収集・分析

- 地形、気象、水文、地下水、土壌等に関する資料
- 社会経済、農業、農業経済に関する資料
- 灌漑排水および農村インフラに関する資料
- 農場、農民組織、農業支援組織に関する資料
- 自然環境に関する資料

(b) 現場調査

- 水文、地下水、水質調査および水収支計算
- 土壌、土地利用調査
- 既存灌漑排水施設調査
- 社会経済、農業、農業経済調査
- 収穫後処理施設および流通システムの現況調査
- 農村道、給水施設、下水施設、配電施設等を含む農村インフラ調査
- 既存農民組織および共同組合の活動状況調査
- 対象裨益農家に対する農業/財政支援体制調査
- 農業生産および市場に対する本事業のインパクト調査
- 自然、社会環境調査

(c) マスター・プラン策定

- 開発ポテンシャル、プロジェクト・ニーズ、農業開発にとっての阻害要因の検討
- 開発の基本方針策定
  - ・水資源開発計画
  - ・農業開発計画
  - ・灌漑開発計画
  - ・農村インフラ計画
  - ・流通システム改善計画
  - ・農業支援および農民組織改良計画
  - ・水管理および施設維持計画
  - ・環境保全計画
  - ・事業費概算およびプロジェクト評価
  - ・総合開発計画の策定

フェーズ-II： 航空写真図化

優先開発地区 3,000~5,000ha（図化面積：5,000~10,000 ha）を対象に航空写真図化（縮尺：1/5,000、等高線間隔：0.5 m）

フェーズ-III： フィージビリティ・スタディ

(a) 補足資料の収集

(b) 現場調査

- 土壌、土地利用調査
- 幹線/2次灌漑水路、幹線/2次排水路沿い地形測量
- 建設資材調査
- 農業、農業経済調査
- 農産物流通調査
- 農業支援組織調査

- 農村インフラ調査
- 自然、社会環境調査

(c) 開発計画策定

- 農業開発計画
- 灌漑排水計画
- 農村インフラ改善計画
- 農産物流通計画
- 事業実施計画
- 事業費算定
- 事業の経済・財務評価

3.4 総合所見

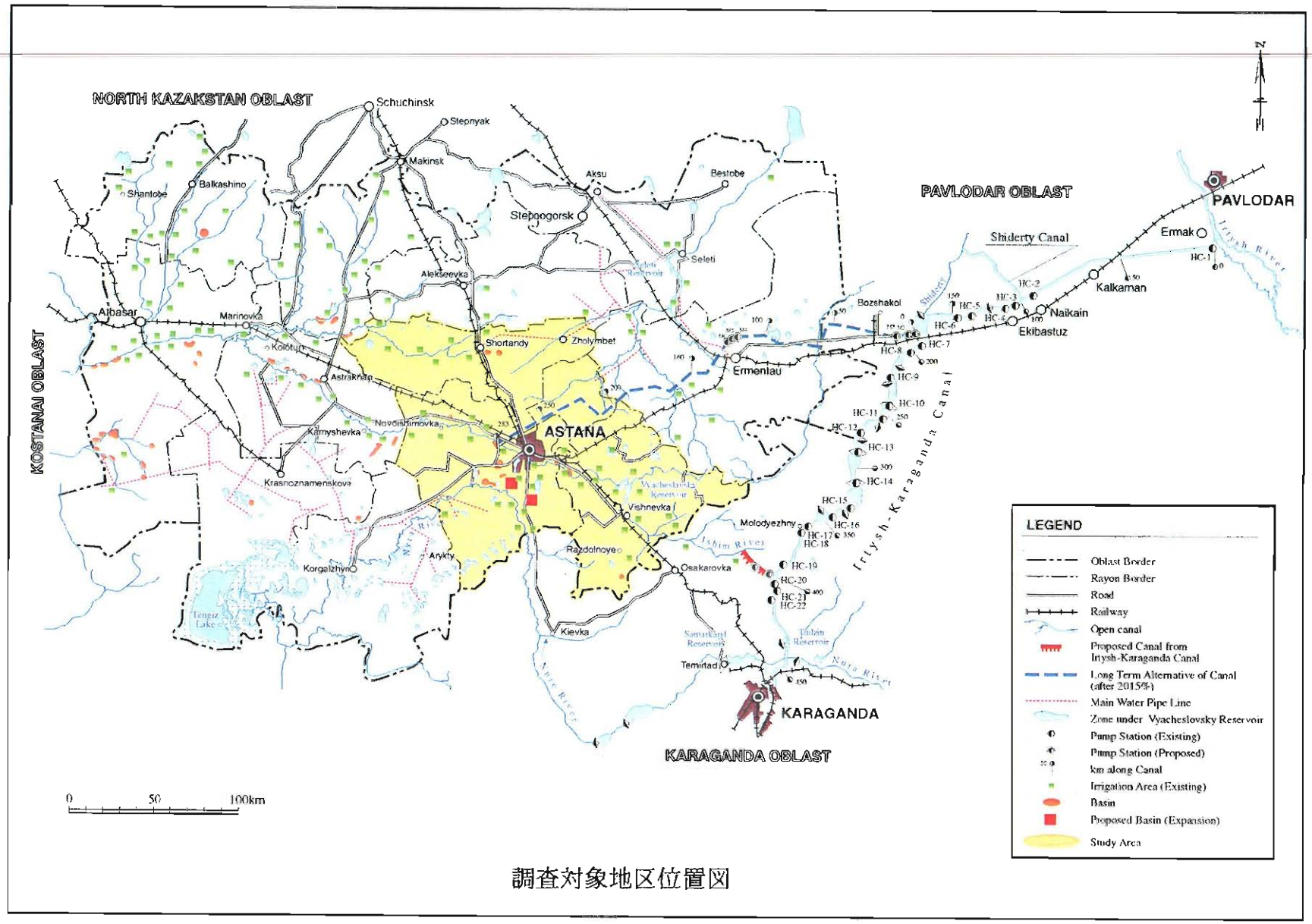
(1) 事業の特徴と意義

新首都アスタナ市は、1998 年の遷都依頼急速に発展し続けている。この発展に伴い、人口も 1997 年では 280,000 人であったものが 1999 年には 400,000 人へと急速に増え続けている。このため、農産物の需要は増大し、農産物の多様化と高品質志向は急速に進んでいる。しかしながら、アスタナ市近郊における農業は未だ収益性の低い伝統的な農業で、また、強風による作物被害が大きく、特に野菜、果物等の農産物の需要に対応しきれない状況にある。

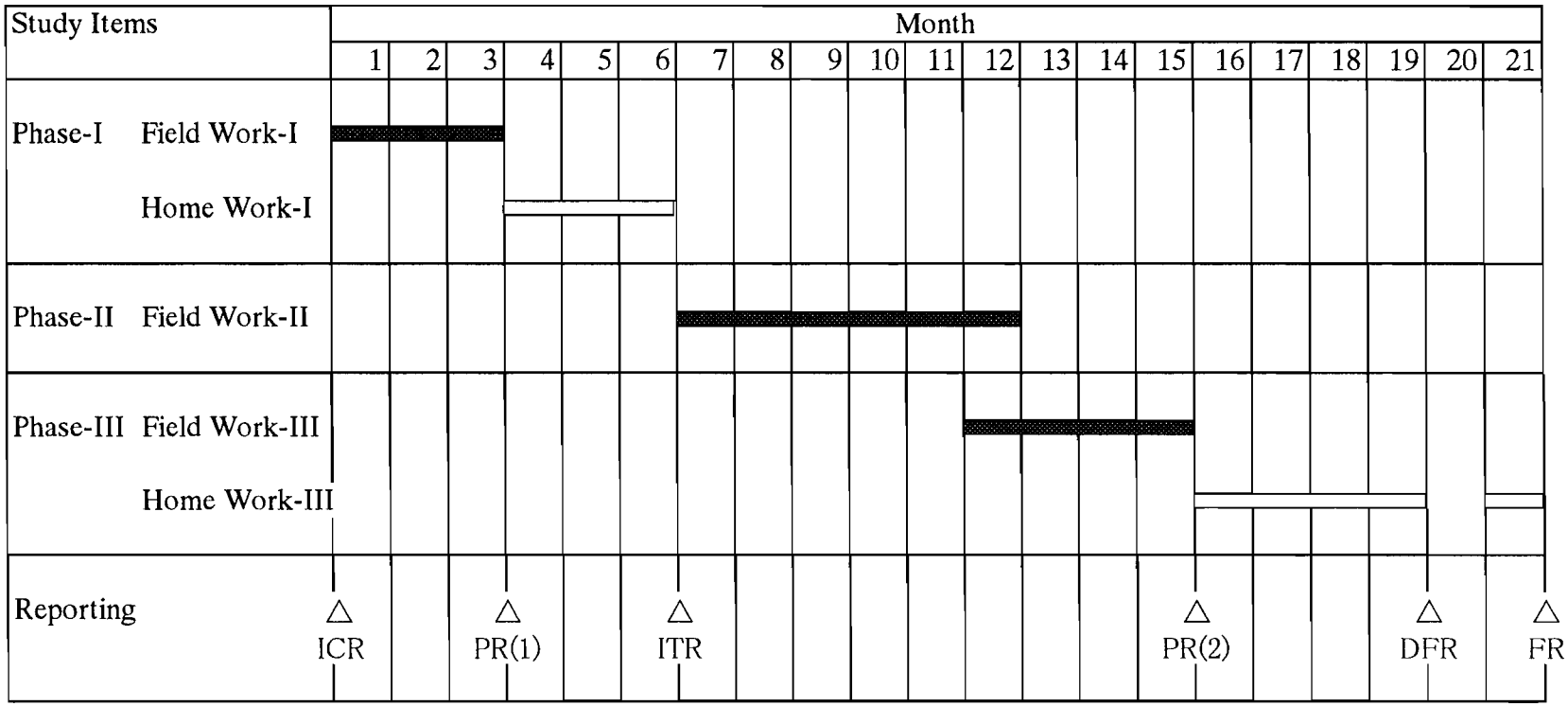
地域経済の健全な発展を達成させるためには、伝統的な天水による畑作から、灌漑施設および防風林開発を中心に据えた農業生産基盤の構築および流通施設の整備が急務であり、首都圏型農業の導入が求められている。また、労働集約型の収益性が高い農業生産団地の形成は、近隣農村部からアスタナ市への労働力流入を抑制することにもなり、都市のスラム化による社会問題を未然に防ぐことにも寄与するものと期待されることから、本開発調査を通して問題点を指摘し、開発方針を提案することは意義がある。

(2) 相手政府の意向

今回の調査時に面談した農業大臣によれば、遷都以来アルマティ市の人口は急激な延びを示し、近い将来、野菜、果物を中心とした農産物の不足が見込まれるとのことで、これら農産物の安定供給および農産物の多様化と高品質志向に対応できる農業基盤を早急に構築したいとしている。なお、この事業実現のためには、首都近郊農業に深い経験を持つ日本の技術を導入したいとし、日本政府の技術および資金援助を強く望んでいる。このような背景から、ADCA 調査団としても当事業を日本政府の優良な ODA 案件として採り上げることが望ましいと判断する。


NORTH KAZAKSTAN OBLAST
KOSTANAI OBLAST
PAVLODAR OBLAST
KARAGANDA OBLAST
Schuchinsk
Stepnyak
Makinsk
Shantobe
Balkashino
Aksu
Bestobe
Stepnogorsk
Seleti
Alekseevka
Aibasar
Marinovka
Kolotun
Shortandy
Zholymbet
Astrakhan
Ermentau
ASTANA
Novoishimovka
Kamyshevka
Krasnoznamenskova
Vishnevka
Razdolnoye
Osakarovka
Arkyk
Korgalzhyn
Kievka
Temirtau
KARAGANDA
PAVLODAR
Shiderty Canal
Ermak
Kalkaman
Bozshakol
Naikain
Ekibastuz
Irtysh-Karaganda Canal
Ishim River
Nura River
Tengiz Lake
Vyacheslavsky Reservoir
Samarkand Reservoir
Dzhezdy Reservoir
LEGEND
Oblast Border
Rayon Border
Road
Railway
Open canal
Proposed Canal from Irtysh-Karaganda Canal
Long Term Alternative of Canal (after 2015Y)
Main Water Pipe Line
Zone under Vyacheslovsky Reservoir
Pump Station (Existing)
Pump Station (Proposed)
km along Canal
Irrigation Area (Existing)
Basin
Proposed Basin (Expansion)
Study Area
0
50
100km

調査対象地区位置図


Study Items
Month
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
Phase-I Field Work-I
Home Work-I
Phase-II Field Work-II
Phase-III Field Work-III
Home Work-III
Reporting
ICR
PR(1)
ITR
PR(2)
DFR
FR
Note:
Work in Kazakstan
Work in Japan
ICR : Inception Report
PR(1) : Progress Report (1)
ITR : Interim Report
RR(2) : Progress Report (2)
DFR : Draft Final Report
FR : Final Report

調査スケジュール（案）

4. コクサライ・ダム灌漑農業・環境改善計画

4.1 計画の背景

本計画はカザフスタン南部を東西に流れるシルダリア河上流部にコクサライ・ダムを建設し、シルダリア河の流量を灌漑およびアラル海周辺の環境保全のために有効に利用しようとするものである。集水面積 150,000 km^2 を有するこの河は、キルギスタン国内を走る天山山脈に源を発し、ウズベキスタンを経由してカザフスタン国に流れ込み最後にアラル海に到達する。カザフスタン国に流れ込むと同時に河川水は 55 億 m^3 を有するチャルダラ湖に一旦貯留され、下流 380,000 ha の灌漑要水に合わせて放流されている。なお、キルギスタンおよびウズベキスタン領内にもいくつかの大型貯水池があり流量は調整されているが、その代表的なものはキルギスタン国内にあるトクトグル貯水池（貯水容量：141 億 m^3）である。

トクトグル貯水池は本来、灌漑に合わせた運用を行うことになっており、灌漑期の 4 月より 10 月にかけて年間放流量の 62%を下流に放流することになっていた。しかし、1993 年以降は冬の電力不足を解消するため、非灌漑期の 11 月から 3 月にかけて年放流量の 60%を発電目的で放流しているため、カザフスタン国内にあるシルダリア最上流のチャルダラ貯水池ではこの冬の間の流量を調整しきれなくなっている。このため、年間約 30 億 m^3 がウズベキスタン国内にあるアルナサイ盆地に流れ込んでおり、下流地域の灌漑面積は 380,000 ha を確保出来ない状態である。また、チャルダラ貯水池下流のシルダリア河は、冬の間凍り付くため通水能力が落ち、シルダリア河の両岸を越流し農地に流れ込んでいるため、周りの農地における地下水位が上昇し塩害が発生している。

上記の状況を深刻に受け止めたカザフスタン政府は、南カザフスタン州内のシルダリア河上にコクサライ・ダムを建設し、流量調整を行うことにより、灌漑面積 380,000 ha の確保、農地の塩類化防止およびアラル海周辺の環境保全を行いたいとしている。

4.2 計画の概要

本計画の目的は、図-I.5 に示すとおりシルダリア河上流部にコクサライ・ダムを建設し、流量コントロールをすることにより、既存灌漑面積 380,000 ha の確保、農地の塩類化防止およびアラル海周辺の環境保全を行おうとするものである。コクサライ・ダムの緒言は概略以下のとおりである。

(a) ダム

- 形式 : 均一型アースフィル
- 堤長 : 34.0 km
- 平均高 : 7.0 m

(b) 貯水池

- 貯水池面積 : 460 km^2
- 総貯水容量 : 30 億 m^3
- 水没公共施設 : 無し

4.3 開発調査

図-I.6 に示すとおり、本計画に関する調査は２フェーズに分けて行われ、フェーズ-I においては灌漑および環境保全を念頭にいれて、世銀が 1995 年 2 月 ~ 1995 年 12 月に行った「Syr Darya Control and Delta Delta Development Project」に関するレポートをレビューし、カザフスタン側流域全体の総合水管理改善計画立案のためのマスター・プランを作成する。フェーズ-II ではコクサライ・ダム建設に関するフィージビリティ・スタディおよび概略設計を行う。調査内容の概要を示せば以下のとおりである。

(1) フェーズ-I： マスタープランスタディ

(a) 関連資料・情報の収集・分析

- 地形、気象、水文、地質、土壌、地下水等に関する資料
- 社会経済、農業、農業経済に関する資料
- 灌漑排水および農業インフラに関する資料
- 自然環境に関する資料

(b) カザフスタン側流域全体における既存開発計画のレビュー

(c) 現場調査

- 水文、地下水、水質調査
- 土壌、土地利用調査
- 代替ダム地点における地形、地質・土質踏査
- 既存灌漑排水施設調査
- 既存水管理状況調査
- 農業、農業経済調査
- 農場および農民組織の活動状況調査
- 自然、社会環境調査

(d) 灌漑および環境保全を念頭にいれて、カザフスタン側流域全体の総合水管理改善計画立案

(2) フェーズ-II： フィージビリティ・スタディ

(a) 補足資料収集および補足調査

(b) ダム地点および貯水池内の地形図作成

(c) ダム地点および採石場における地質調査

(d) ダム地点および土採場における土質調査

(e) 開発計画策定

- ダムの予備設計
- 水管理およびダム運用計画

- 環境保全計画
- 事業便益の算定
- 事業費の算定
- 事業評価
- 事業実施計画

4.4 総合所見

(1) 本開発の特徴と意義

シルダリア河上流（キルギスタン国内）にあるトクトグル・ダムは本来、下流地域の灌漑パターンに合わせたダム運用となっており、4 月より 10 月にかけて年間放流量の約 60%を下流に放流することになっていたが、1993 年以降、冬における電力不足を解消するため、逆に 11 月から 3 月にかけて 60%の放流を行っているため、カザフスタン国内にあるシルダリア最上流のチャルダラ貯水池ではこの多量の流量を調整しきれなくなっている。このため、多量の水はウズベキスタン国内にあるアルナサイ盆地に流れ込んでおり、下流地域では灌漑用水の不足が起こり、また、アラル海への流入量が減少している。

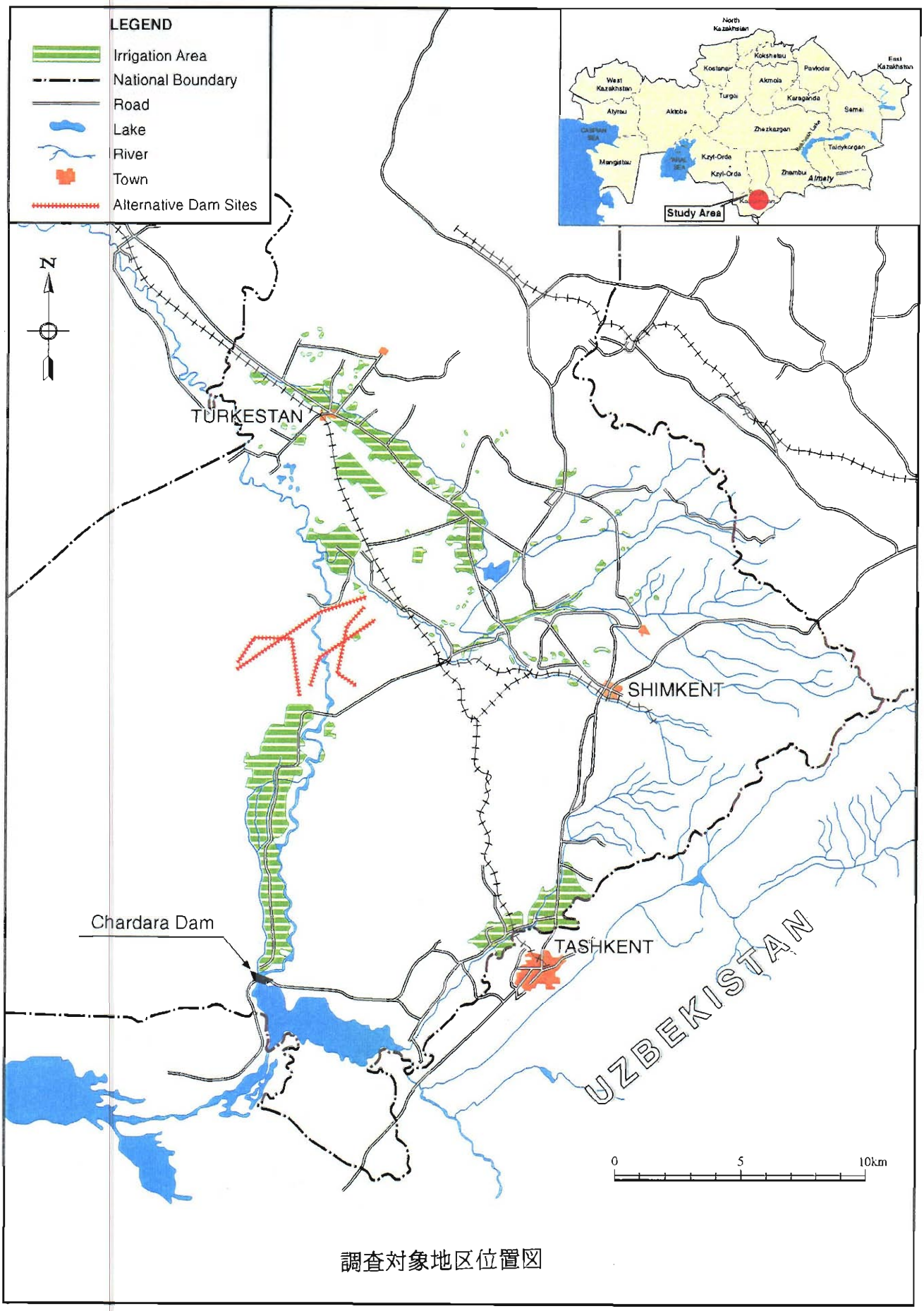
また、チャルダラ貯水池下流のシルダリア河は冬の間凍り付くため、その通水能力は極端に落ち、シルダリア河の水は両岸を越流し地中に浸透するため地下水位は上昇し、川沿いの農地では塩害が発生し始めている。

一方、ウズベキスタン政府はアルナサイ盆地の湛水に対する補償費として年間 25 百万ドルを要求しているとのことである。

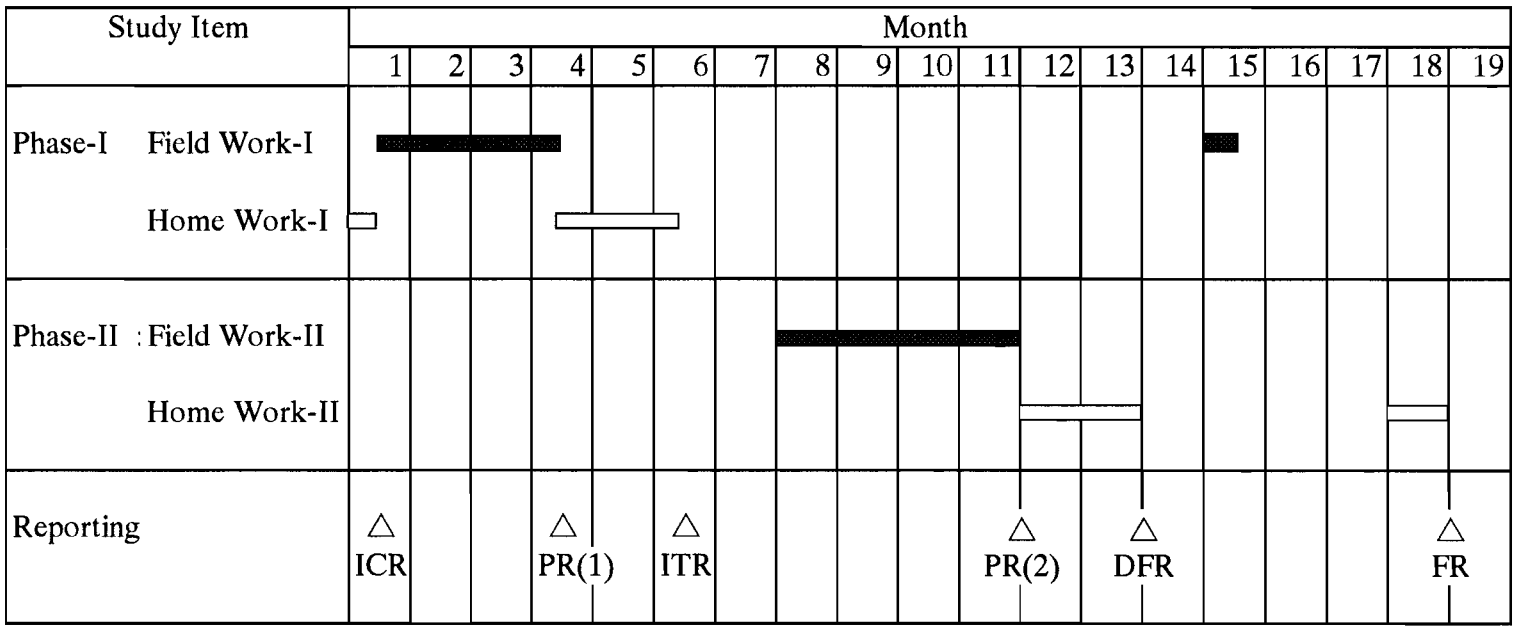
上記状況から、カザフスタン政府は「コクサライ・ダム灌漑農業・環境改善計画」を実現することにより、下流地域に対する灌漑水の確保および環境対策を講じたいとしており、その開発調査を日本の技術協力に期待している。

(2) 相手政府の意向

今回の調査時に面談した農業大臣、水資源委員会委員長および南カザフスタン州政府関係者によれば、本事業の優先度は高く、OECF 借款を対象とした「中期投資計画、1999 – 2003」の中で優先順位を第 1 位としている。しかしながら、円借款要請に必要なフィージビリティ・スタディがまだ行われていないことから、日本政府にその開発調査を早急に要請したいとしている。


LEGEND
Irrigation Area
National Boundary
Road
Lake
River
Town
Alternative Dam Sites
N
TURKESTAN
SHIMKENT
Chardara Dam
TASHKENT
UZBEKISTAN
0
5
10km
Study Area
North Kazakhstan
Kokshetau
Kostanay
Pavlodar
East Kazakhstan
West Kazakhstan
Aktobe
Turgai
Akmola
Karaganda
Atyrau
Semei
Zhezkazgan
Mangistau
Kzyl-Orda
Zhambu
Almaty

調査対象地区位置図



Note:

Work in Kazakstan

Work in Japan

ICR : Inception Report
PR(1) : Progress Report (1)
ITR : Interim Report
RR(2) : Progress Report (2)
DFR : Draft Final Report
FR : Final Report

調査スケジュール（案）

図-I.6

II. ウズベキスタン共和国

1. ウズベキスタンの概況

1.1 国土と人口

ウズベキスタン国は北部および西部はカザフスタン、南部はトルクメニスタンおよびアフガニスタン、また、東部はキルギスタンおよびタジキスタンと国境を接している内陸国である。総国土面積は 450,000km² で、東西約 1,430km、南北約 930km に広がっており、その約 60%は砂漠やステップで占められている。

中央アジアの中心部に位置するウズベキスタンは、天山山脈とその南のゼラフシャン山脈の西部山麓を基線としてアラル海域までシルダリアおよびアムダリア両河川に挟まれた長方形の国土を占める。国土の 80%は西部から中央部にかけて広がる低平地で、中央部にはキジルクム砂漠とアラル海南東部のトゥラン低地とが広域に広がっている。一方、東部と南部には天山、ギサル、アライ山脈があり、その間にフェルガナ、ゼラフシャン、チルチク、アングサン等の盆地が広がっている。

ウズベキスタンの気候は大陸性気候帯に属し乾燥している。年間平均降水量は、国内の大部分で 200mm 以下であり、一部の地域では 70~80mm に過ぎない。雨期は冬と春に集中しており、夏は暑く乾燥しており 5 月から 10 月まで続く。

シルダリアおよびアムダリア河はウズベキスタンにおける二大水源である。集水面積 15 万 km² を有するシルダリア河はキリギスタン国内を走る天山山脈に源を発し、ウズベキスタン国内に流れ込み、その後カザフスタン国内を北西に走り最後にアラル海に流れ込んでいる。一方、集水面積 22.8 万 km² を有するアムダリア河は、遠くパミール高原にその源を発し、アフガニスタンを流れてトルクメニシタンを通った後ウズベキスタンに入り、アラル海に流れ込んでいる。ソ連時代にこれらの河川沿いに行われた大規模灌漑開発による多量の水使用はアラル海への流量減少に繋がり、現在世界的に注目されているアラル海に生態系の破壊を引き起こしている直接の原因となっている。

この国は、1995 年現在総人口 22.56 百万人を有し、これは中央アジア最大であり、また、多くの人種よりなる多民族国家である。主要民族は、ウズベック系 74.4%、ロシア系 6.9%、タジク系 4.1%、カザック系 4.1%等で、その他タタール系、キルギス系、ユダヤ系、ドイツ系等 120 民族が居住している。人口増加率は、1980 年代は平均 2.5%であったが、その後ロシア系、タタール系、ユダヤ系、ドイツ系民族の国外流出が続いており、1990~1995 年における平均増加率は 2.3%となっている。

1.2 国家経済

ウズベキスタンは、ロシアの行った急進的な経済改革路線とは一線を画し、国家による経済の管理のもと斬新主義に基づく独自の改革路線を取ったため、旧ソ連の経済的な枠組崩壊の悪

影響は他の CIS 諸国に比べ比較的少なく、また、もともと農業国である上、エネルギーも豊富であることから、旧ソ連邦共和国の中では生産性低下の一番少ない国であった。また、天然ガス等の豊かな資源を市場価格で独自に取引できるようになった独立のメリットを最大限に利用できるようになったことから、1993 には回復の兆しの見え始め、1993 年には日用品、軽工業製品を中心に生産性の低下に歯止めが掛かり、経済の悪化は底を打ったとの見方がある。

一方、ウズベキスタンにおける経済政策のもうひとつの特徴は、エネルギーと穀物の自給を最優先課題としていることである。すなわち、ロシアから経済的独立の確立である。ウズベキスタンは、従来年間 600 万トンの石油を輸入してきたが、1995 年の輸入量は 70 万トンに留まり、1996 年には輸入をストップしたとの報告もある。

ウズベキスタンにおける産業構造の推移を NMP (純物質生産)構成比で示せば以下のとおりである。

(単位：%)

産業	1992	1993	1994	1995
農業	41.4	30.8	34.5	28.5
工業	32.7	28.9	17.0	16.4
建設	11.3	11.7	7.3	7.8
運輸・通信	5.5	5.0	5.8	8.4
商業、サービス、他	9.2	23.6	27.2	25.4
輸入税、関税等	-	-	8.2	13.5
全体	100	100	100	100

旧ソ連の計画経済のもと、ウズベキスタンは綿花栽培とその関連産業に集中した経済発展を強いられてきたが、独立後は上表が示すとおりやや多様化の傾向にあり、NMP 構成では農業・工業の割合が低下、商業その他が上昇している。農業も食糧自給の観点から綿花モノカルチャーからの脱却を図っており、穀物、果実、野菜等の生産が増加している。

1.3 農業現況

ウズベキスタンは、ソ連時代は綿花生産に特化した原料生産型のモノカルチャー経済で、中央が作成した計画経済に従いロシアを中核とする共和国間分業体制のもと、原料をロシアへ移出し、加工製品をロシアから移入して経済を運営してきた。その農業を中心とする産業構造は独立後もそのまま残っており、農業は GDP の 36%を占め、また、同部門への就業人口は全体の約 42%と同国最大の産業となっている。

ウズベキスタンの綿花は全輸出量の 80%、輸出収入の 75%を占め、綿生産は政府の強い管理下に置かれている。その結果、綿花栽培と競合する小麦などの穀物栽培が停滞し、食糧自給ができずロシアなどからの移入をせざるをえなかった。従来の潅漑面積拡大による増産手法には主に水源の問題から限界が生じていることもあり、綿花への過度の依存体制から脱却し、食糧自給率向上に向けた努力が続けられている。このため、単一作物の生産を抑制し、食料輸入への依存を断ち切るため、政府は穀物の増産を図ることとし、綿花の作付け面積を削減し、穀物用の農地、特に潅漑農地で作付け転換を行なうことになっている。農業省では綿花の生産は、作付け面積が減少しても、反収の向上により現在の生産量を維持できるとしている。

この国で栽培されている穀類は、冬小麦、冬大麦、水稲、トウモロコシで、このうち主要穀類は小麦と水稲で、それぞれ穀類全生産量の45%および24%を占める。穀類の総生産量は、1983年の326万トンをピークにしてその翌年は半減し、その後1991年より1994年までは200～250万トンの間を変動していたが、穀物作付け面積の急激な増加により、1995年には320万トンに達した。

リンゴ、ブドウ等の果物およびトマト、ニンジン、タマネギ等の野菜の生産は90年以降急上昇し、加工食品および生鮮野菜として重要な輸出品目になりつつあるが、旧式な加工施設および市場機能の未整備による流通システムの不備等で、加工即品の品質が悪く、また、30%以上の流通ロスがあると言われている現状から、加工・流通システムの改善が重要な課題となっている。

1991年より1995年までの農産・畜産物の生産高を示せば下表のとおりである。

(単位：千トン)

生産物	1991	1992	1993	1994	1995
綿花	4,646	4,128	4,234	3,938	4,200
ジャガイモ	351	365	472	562	500
蔬菜類	3,348	3,494	3,039	2,918	3,000
穀類	1,908	2,257	2,142	2,467	3,200
肉類	492	469	517	509	519
乳製品	3,331	3,679	3,764	3,733	3,686

1.4 農業の課題

農業部門の開発においては、国家統制から市場経済への移行と国際価格に基づいた効率的生産体制の確立を図ることが基本である。これを実現するに当たって、農業セクターの開発課題を挙げれば以下のとおり整理される。

(1) 綿花依存のモノカルチャー経済から脱却
(2) 食糧・農産物の増産
(3) 環境保全型持続的農業生産の確立
(4) 農産物の加工・流通システムの改善
(5) 潅漑水管理技術の改善
(6) 綿花以外の輸出農産物の育成
(7) 農村の生活改善と地域振興

2. フェルガナ州排水改良・貧困地域農業振興計画

2.1 計画の背景

本計画対象地域であるフェルガナ州は、この国の最東端にあるフェルガナ盆地の南部を占めている。州都フェルガナは首都タシケントの南東 250kmに位置し、これら両都市は国道によって結ばれている。全面積 4,810 km^2 を有するこの州には人口 2.74 百万人が住んでおり、この国では人口密度が最も高い州である。

この地域はオアシス灌漑発祥の地で、全農地 359,000 ha のうち 80%に相当する 287,000 ha は灌漑農地となっているが、実際に灌漑されている面積は 216,000 ha となっている。これは１人当たりの面積に換算すれば 0.1ha 以下であり、他の州と比べてかなり低い。このため、農家所得は全国的に見て最も低いレベルにある。

本地域における主な作物は綿（127,000ha)、小麦（92,000 ha)、果物（34,400 ha)、飼料作物（16,200 ha)、野菜（5,600 ha）等であるが、これらの収量は綿 2.3ton/ha、小麦 2.9tonn/ha、果物 2.1ton/ha、飼料作物 10.8ton/ha、野菜 16.8ton/ha 等といずれも低い。この収量の低い原因として、①地下水位が異常に高く塩害が発生していること、②灌漑施設の老朽化および圃場整備の遅れで灌漑水が効率よく圃場に到達していないこと、③資金不足により農機具の更新が為されておらず、また、十分な肥料・農薬の購入ができないこと、および④農業支援組織が発達していないことなどが考えられる。これら阻害要因の中で最も深刻なものは、最近激しさを増している地下水の上昇である。これはキルギスタン国側で大規模な灌漑開発が行われたことにより、その余剰水が地下水となってウズベキスタン側のフェルガナ盆地に流れ込んでいるためである。この地下水上昇は農地のみならず住宅地にまで影響を及ぼし、ある農場では 2,000 住宅のうち 380 住宅は倒壊のため移転したとのことであった。この地下水上昇被害はフェルガナ州内のアルチャリック、リシュトンおよびバグダッドの３郡で顕著に見られる。

上述のとおり、対象地区内には 287,000 ha の灌漑農地があるが、実際には 216,000 ha が灌漑されている。しかしながら、予算不足のため、地下水対象の排水事業は思うに任せず、また、灌漑施設の維持管理が十分に行われていないことから、耕作不適地が年々増加しており、当地域における農業にとって深刻な問題となっている。

当調査対象地域における主な水源はナリン川、カラダリア川等シルダリア河の支流であり、また、地下水も一部で利用されている。主な灌漑排水施設を示せば以下のとおりである。

(単位: km)

灌漑・排水路	延長
幹線水路（６本）	680
２次灌漑水路	3,055
三次灌漑水路	2,031
２次排水路	3,862
３次排水路	9,079
排水用井戸数	1,288

上記状況から、ウズベキスタン政府は、調査対象地域における排水改良および農業振興を行い、地域住民の生活水準および生活環境の改善を実現したいとしている。また、効率の悪い既存灌漑施設の改良および水管理を徹底することによる節水灌漑を実施し、現在世界的に注目を集めているアラル海の環境改善を推進したいとしている。

2.2 計画の概要

(1) 目的

本計画の目的は、地域住民の生活水準の向上および雇用機会の創造を目的として、フェルガナ州における収益性の高い農業生産基盤の構築ならびに効率的な収穫後処理施設および農産物流通システムの設立にある。この目的を達成するための基本概念は以下のとおりとする。

(a) 有効な土地利用、農業技術の改良、灌漑排水施設の改修・改善および圃場整備を行うことによる土地・水資源の有効利用を通して農業生産基盤を強化する。

(b) 地下排水施設を建設することにより地下水を低下させ、土地の生産性および住宅地におけるける生活環境を改善する。

(c) 農産物価格の安定、収穫後処理施設ならびに農産物流通施設の改善、市場の開拓、市場組織および法制度の整備を通して流通システムを強化する。

(d) 農民に対する金融制度の開放、農業普及制度ならびに情報システムの設立および農民組織の強化を通して農業支援サービスを強化する。

(2) 開発のコンポーネント

本開発計画におけるコンポーネントは概略以下のとおりである。

(a) アルチャリック、リシュトンおよびバグダッドの 3 郡を中心とした地下排水施設の建設

(b) 水路のライニングおよび関連施設の改修および圃場整備をふくむ灌漑施設の改修・改善

(c) 農村道、給水施設および配電施設を含む農村インフラの整備

(d) 収穫後施設および農産物流通システムの改善

(e) 高収益品種の選定、多用化作付体系の導入、肥料/農薬の適時・適量施用等を考慮した近代農業技術の導入

(f) 農業研究、農民金融、農業普及等を含む農業支援組織の確立

(g) 農産物の集荷・販売、農業投入資材の購入、農業機械の貸し出し等を扱う農業協同組合の設立

(h) 効率的な水管理システムの構築

(i) 灌漑および農業実績ならびに環境評価を対象としたモニターリングの継続

2.3 開発調査

(1) 調査対象地区

フェルガナ州全域とする（図-II.1 参照)。

(2) 調査期間および調査内容

図-II.2 に示す如く、本計画に関する調査は 10 ヶ月かけて行わる。この調査期間の最初の４ヶ月間は現地にて、開発のポテンシャルの検討、事業の必要性、開発戦略、日本政府の無償資金協力にふさわしい優先事業の選定等を行い、これらの結果をインテリム・レポートに取りまとめる。その後４ヶ月間継続して現地にてマスタープランの作成および優先地区の概略設計を行い、これらの結果を最終的にマスター・プラン報告書（ドラフト）に取り纏めることとする。調査の概要を示せば以下のとおりである。

第１段階（前半４ヶ月間）

(a) 関連資料・情報の収集・分析

- 地形、水文、地下水、土壌等
- 社会経済、農業、農業経済等
- 灌漑排水および農村インフラ
- 農場、農民組織、農業支援組織等
- 自然環境

(b) 現場調査

- 水文、水質調査
- 地下水位調査
- 土壌、土地利用調査
- 既存灌漑排水調査
- 社会経済、農業、農業経済調査
- 農村インフラ調査
- 自然、社会環境調査

(c) 全調査対象地域の航空写真撮影

(d) 開発のポテンシャル、開発にとっての阻害要因、事業の必要性、開発戦略の検討

(e) 無償資金協力にふさわしい優先事業の選定

(f) 調査、検討結果の取り纏めおよびインテリム・レポートの作成

第２段階（後半４ヶ月間）

(a) 補足資料の収集

(b) 優先地区約 100km^2(周辺地区を含む)を対象に航空写真図化

(c) 開発計画策定

- 水資源開発計画
- 地下排水計画
- 農業開発計画
- 灌漑計画
- 農村インフラ改善計画
- 環境保全計画
- 事業費算定
- 事業の経済・財務評価
- 事業実施計画
- 優先地区の概略設計、工事費算定および無償資金協力妥当性の検討
- マスタープラン・レポートの作成

2.4 総合所見

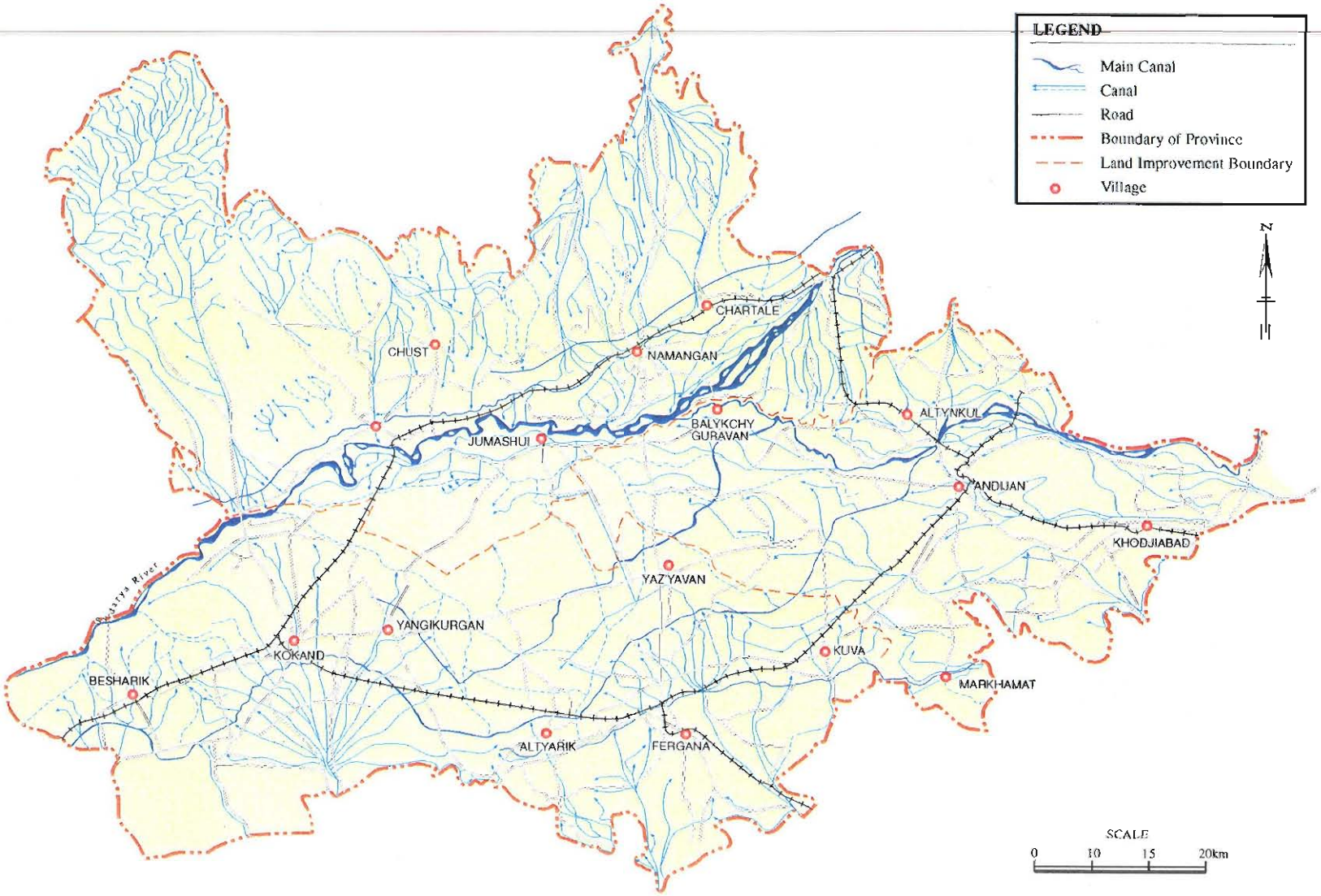
(1) 事業の特徴と意義

本開発計画の対象地域であるフェルガナ州はウズベキスタン国における最大の人口稠密地帯であり、このため１人当たりの農地面積は国全体平均の 1/3 と全 13 州の中で最小であることから、最も貧しい州の一つとして数えられている。また、予算不足のため、地下水対象の排水事業は思うに任せず、加えて灌漑施設の維持管理が十分に行われていないことから、耕作不適地が年々増加しており、当地域における農業にとって深刻な問題となっている。このため、ウズベキスタン政府はこの地域の灌漑排水施設の整備を計画し、それによる作物生産の増加および農民の生活水準の向上を期待している。本計画地域を中心にパイロット事業として、灌漑排水施設の改修・改善を行うと共に、水管理の合理化、作物栽培法の改善、流通の合理化、市場経済に適した農場経営の改善等を試みることは大きな意味を持つ。

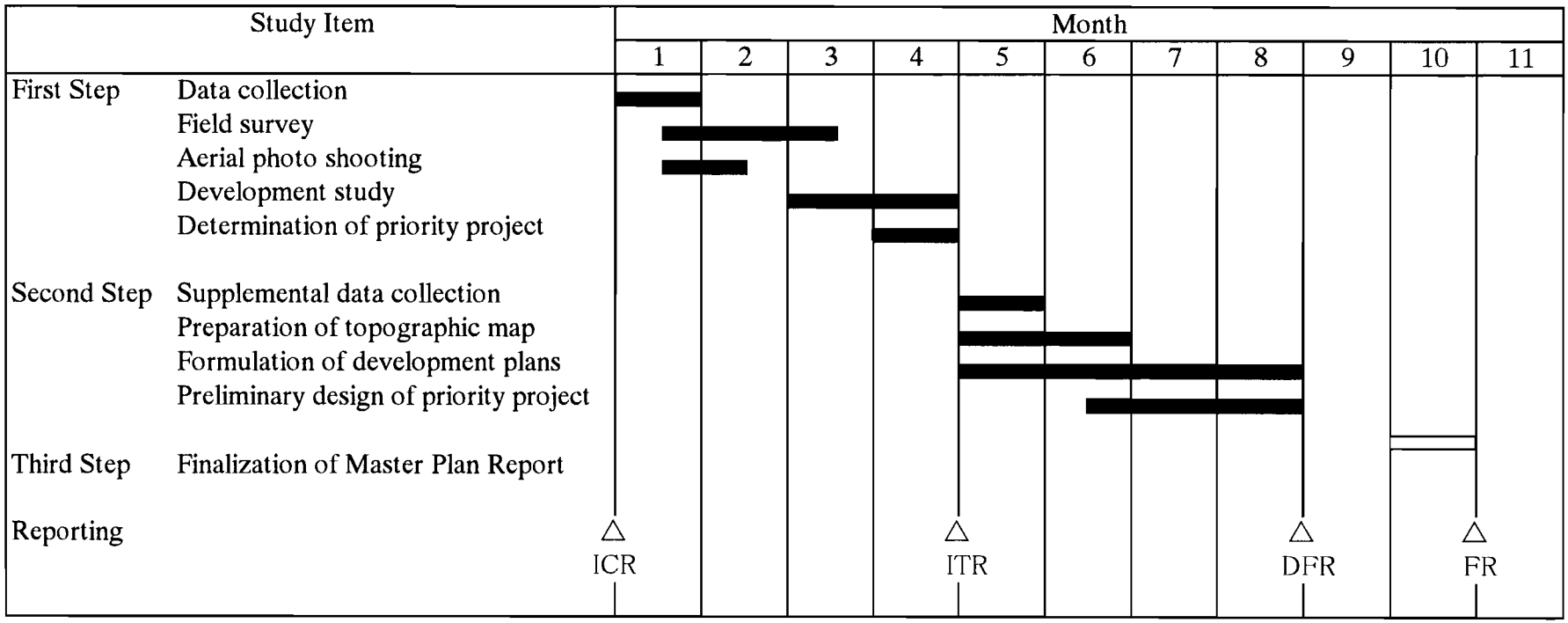
なお、本計画地域の水源であるナリン川、コラダリア川等はシルダリア河の支流であることから、この地域における節水灌漑を実現させることにより、本計画は現在世界的に注目されているアラル海の環境改善に大きく寄与することになる。

(2) 相手政府の意向

ウズベキスタン政府のフェルガナ盆地、この中でも特に貧困層の多いフェルガナ州に対する開発の優先度は農業次官、農業省水路維持管理局長およびフェルガナ州政府関係者との面談を通して確認できた。また、農業次官によれば、本計画地域の地下水による農地および住宅地への被害は深刻であり、緊急性を要することから、早急に日本政府の開発調査および無償資金協力をお願いしたいとしており、ADCA 調査団としても本開発計画を日本政府の優良な ODA 案件として採り上げることが望ましいと判断する。


LEGEND
Main Canal
Canal
Road
Boundary of Province
Land Improvement Boundary
Village
N
CHARTALE
CHUST
NAMANGAN
ALTYNKUL
BALYKCHY
GURAVAN
JUMASHUI
ANDIJAN
KHODJIABAD
YAZYAVAN
Syrdarya River
YANGIKURGAN
KOKAND
KUVA
BESHARIK
MARKHAMAT
ALTYARIK
FERGANA
SCALE
0
10
15
20km

調査対象地区位置図



調査スケジュール（案）

図-II.2

III. トルクメニスタン共和国

1. トルクメニスタンの概況

1.1 国土と人口

トルクメニスタンは中央アジアの西部に位置し、北はカザフスタン、北東および東はウズベキスタン、南はイラン、また、南東はアフガニスタンと国境を接している内陸国である。国土の総面積は 488,100㎢ で、東西約 1,100㎞、南北約 650㎞ に広がっている。国土の 90%は砂漠（中央砂漠、ザウングズ砂漠、カラクム砂漠）に覆われ、また、南にコペトダグ山脈、西にはカスピ海があり、東にはアムダリア河が流れている。

トルクメニスタンの気候は典型的な砂漠気候で、降水は春に集中する。年間平均降水量は、国内の大部分で 250㎜ 以下であり、一部の地域では 100 - 110㎜ に過ぎない。夏は高温で 40℃を越し、最高で 50℃に達することもある。一方、冬は平均 0℃にまで下がる。また、快晴の日が多く、首都アシュガバードでは年間平均で 150 日が晴天である。

アムダリア河はトルクメニスタンにおける最重要水源である。集水面積 22.8 万 ㎢ を有するアムダリア河は、遠くパミール高原、ヒンズークシ山脈およびテンシャン山脈地帯にその源を発し、アフガニスタンを流れてトルクメニスタンを通った後ウズベキスタンとの国境沿いを流れ、アラル海に流れ込んでいる。ソ連時代にこの河川沿いに行われた大規模灌漑開発による多量の水使用はアラル海への流入量の減少に繋がり、現在世界的に注目されているアラル海における生態系の破壊を引き起こしている直接の原因となっている。

この国は、1995 年現在総人口 4.6 百万人を有し、その大部分はアムダリア川およびカラクム水路沿いに住んでいる。人口密度は 1㎢ 当たり 9.0 人と、旧ソ連構成共和国の中ではカザフスタンに次いで低い。また、この国は多くの人種よりなる多民族国家である。主要民族は、トルクメン系 77.0%、ウズベク系 9.2%、ロシア系 6.7%系、カザフ系 2.0%、その他 5.1%の民族が居住している。出生率の増加と純移民流入による急激な人口増加率が特徴であり、1989 以降の年平均増加率は 3.9%である。

1.2 国家経済

独立後のトルクメニスタンは、ロシアの行った急進的な経済改革路線とは一線を画し、国家による経済管理のもと漸進主義に基づく独自の改革路線を取ったため、旧ソ連の経済的な枠組崩壊の悪影響は他の CIS 諸国に比べ比較的少なく、また、もともと農業国である上、エネルギーも豊富であることから、旧ソ連の中では生産性低下の一番少ない国であった。また、天然ガス等の豊かな資源を市場価格で独自に取引きできるようになった独立のメリットを最大限に利用できるようになったことから、1993 年には回復の兆しも見え始めたが、1994 年以降はウクライナ、アゼルバイジャンをはじめとする一部 CIS 諸国からの天然ガス代金の未払いが増え、天然ガスの生産を減らさざるを得なくなったことから、工業部門の生産性は 1993 年に比べ 75%程度に留まり、このため 1993 年に 8%であった実質 GDP 成長率は 4 ~ 5%のマイナス成長となっている。

トルクメニスタンにおける経済のもうひとつの特徴は、天然ガスと綿花生産に極度に集中していることである。この国では、旧ソ連時代にカラクム水路の建設をはじめ、大規模な潅漑事業、ガス資源開発、パイプライン建設が進められた。その結果、天然ガスではソ連構成共和国の内ロシアに次いで2位、綿花でもウズベキスタンに次いで2位を占めるまでになったが、食糧・消費財は他の共和国からの輸入に頼ることとなった。

トルクメニスタンにおける産業構造の推移を NMP(純物質生産)構成比で示せば以下に示すとおりである。

(単位：%)

産業	1992	1993	1994	1995
農業	16.3	12.2	24.2	34.9
工業	65.1	62.4	40.7	24.8
建設	9.0	14.3	26.2	14.7
運輸・通信	3.9	4.6	3.0	5.6
商業、サービス、他	5.7	6.5	5.9	4.3
輸入税、関税等	-	-	-	5.6
全体	100	100	100	100

トルクメニスタンは旧ソ連の計画経済のもと、天然ガスおよび綿花栽培とその関連産業に集中した経済発展を強いられてきたが、独立後は上表が示すとおりやや多様化の傾向にあり、NMP構成では工業の割合が低下、農業、建設、その他が上昇している。特に農業は食糧自給の観点から綿花モノカルチャーからの脱却を図っており、穀物、果実、野菜等の生産が増加している。

1.3 農業現況

トルクメニスタンは農業生産が GDP の約 30%、また、農業人口は全雇用人口の 43%を占めており、基本的に農業国である。トルクメニスタン農業の特徴は、乾燥気候のため、潅漑が非常に発達していることである。1995 年の潅漑農地面積は 177 万ヘクタールで、これは全耕地面積の 95%に相当する。しかしながら、旧ソ連邦時代の農業生産は、綿花生産に特化しており、この潅漑農地の半分は綿花栽培地として利用され、穀物等の食糧の大部分は他国から輸入していた。独立後は、政府は食糧の自給達成を優先課題に掲げ、潅漑施設を始めとする農業インフラの整備に力を入れており、1998 年には自給体制を達成したと言われている。

1991 年より 1995 年までの農産・畜産物の生産高の推移を示せば下表のとおりである。

(単位: 千トン)

生産物	1991	1992	1993	1994	1995
穀類	516	737	974	1,130	1,109
綿花	1,433	1,300	1,431	1,283	1,293
ジャガイモ	30	35	32	30	21
野菜	388	313	286	340	376
食肉	100	98	110	107	111
ミルク	458	471	712	716	727
卵 (100 万個)	300	292	267	270	270

上表が示すとおり、綿花の生産高は停滞気味である。この主な原因は、潅漑施設管理の不備

や粗放的な作付けにより地力の低下を招くなどといった、主に旧ソ連時代の農業部門における管理の悪さが挙げられる。とは言え、綿花の生産高は農業部門全体における生産高の４割を占める最重要農産物である。しかしながら、ここで忘れてはならないことは、旧ソ連邦時代に綿花栽培のために、アムダリア河を使った潅漑農地の拡大が積極的に推進されたことにより、アラル海の環境破壊を引き起こし、今日大きな問題となっていることである。

その他の作物としては、食糧の自給自足を達成するため穀物の生産が伸びていることが特徴的である。1995 年の穀物の生産高は、1991 年と比較して約 2.1 倍と大幅に増大している。なお、穀物のうち、米については自給自足に達しており、小麦については自給自足を達成するため収穫向上を目指し二期作が行われている。野菜は、1992 年から減少傾向にあったものが 1994 年より増加傾向に転じ、1995 年には 1991 年レベルにまでほぼ回復した。政府はトルクメニスタンの特産物であるメロン、ブドウの輸出の拡大を計画していることから、生産高、作付面積とも増加するものと思われる。

1.4　農業の課題

農業部門の開発においては、国家統制から市場経済への移行と国際価格に基づいた効率的生産体制の確立を図ることが基本である。これを実現するに当たって、農業セクターの開発課題を挙げれば以下のとおり整理される。

(a) 綿花依存のモノカルチャー経済からの脱却
(b) 生産基盤の改善を通しての食糧・農産物の増加
(c) 綿花以外の輸出農産物の育成
(d) 環境保全型持続的農業生産の確立
(e) 農産物の加工・流通システムの改善
(f) 農業および潅漑水管理技術の改善
(g) 農業に関する情報システムの構築
(h) 農村の生活改善と地域振興

2. トルクメニスタン農業大学農業訓練センター設立計画

2.1 計画の背景

旧ソ連時代には農業研究の組織は良く整備されていたが、その成果を利用していたとは言い難い。この時代の農業研究とは農場の作物生産を増加させる技術を開発し、その研究結果を州および郡農業部、農場長および農場内の専門家に提供することであった。研究結果を受け、農場長は計画経済の下で中央で定めた各作物の生産目標を達成することが目標となっていた。農場労働者は農業知識獲得のための訓練を受ける機会は無く、また、作物栽培計画の作成や計画の運営管理へ関与することもなく、農場の全体的な運営に携わることなしに与えられた作業をただ行っていたに過ぎない。この意味から、トルクメニスタンには他の CIS 諸国と同様、西側諸国で言われているような農民訓練および農業普及は存在しない。

しかしながら、市場経済に移行後は、収量の増大、資材投入量の節約、作物保護、土壌保全、生態系の維持、灌漑効率の上昇、労働生産性の向上、市場の合理化および各農家の収入増加などを達成するための新技術の開発成果を組織的に農民に伝達する農業普及および農民訓練が重要であることを政府は認識し、トルクメニスタン農業大学の下に農業訓練センターを設立することを計画中である。

2.2 計画の概要

(1) 目的

本計画の目的は、トルクメニスタン農業大学の下に農業訓練センターを設立し、農民訓練および農業普及に携わる農業･水資源省職員および農民リーダーに対する訓練を行うことにある。この目的を達成するために、農業・水資源省職員および農民リーダーに対し以下のトレーニングを行うこととする。

(a) 農業・水資源省職員に対するトレーニング

農業訓練センターは農業・水資源省職員の農民訓練および農業普及に対する能力を高めるために、概略以下の項目について研修/セミナーを行う。

① 効果的に事業を実行する能力を付けるために、事業の目的や実施過程を職員に対しオリエンテーションする。

② 職員間の連携をよくし、職務に対しチーム・アプローチができる組織を構築する。

③ 作物栽培、家畜の飼育、水管理、農業政策、農業研究、市場開発、農産物および家畜の価格決定メカニズムおよび農産加工法に関する研修を行う。

④ 事業を通し職員の能力向上を再検討し、全体として事業実施能力を高める改善方法を習得する。

(b) 農民リーダーに対するトレーニング

農民の農業および灌漑技術を開発するために、州の農業事務所によって推薦された農民リーダーを対象に以下の項目に対して研修を行う。

① 選定された新品種作物の栽培技術、肥料・農薬の適正投入方法、灌漑手法、水管理方法、施設の維持管理方法および適切な家畜飼育方法等を含む農業研修。

② 農業普及、協同組合運営、農産物流通および農民金融等農業支援制度に関する研修。

③ 研修センターの付属農場における農業実習

(2) 研修センターの施設内容

研修センター設立に当たって、トルクメニスタン政府は以下の施設を同大学の農場（500 ha）内に建設したいとしている。

(a) 建物関係

- 講義室、図書室を含む管理事務所
- 農業試験室
- ゲスト・ハウスよよび寮
- 農業投入資材用倉庫
- 車庫および修理場
- 電気、ガスおよび給水施設
- フェンス

(b) 農場

- 灌漑施設（スプリンクラー、ドリップおよび開水路）
- 試験圃場
- 展示圃場
- 種子増殖圃場
- 野菜、シイタケおよび花卉栽培用グリーンハウス
- 牛、豚、鶏飼育場
- 国道より農場までの道路改修

(c) 機器類

- ポンプ
- 精肉用ミニプラント
- 乳製品加工用ミニプラント
- 配合資料製造プラント
- 維持管理用機材

2.3 開発調査

(1) 調査対象地区

首都アシュガバード北東 15 km に位置するトルクメニスタン大学付属農場 500 ha
（図-III.1 参照）

(2) 調査内容および調査期間

図-III.2 に示す如く、10 ヶ月間をかけてフィージビリティ・スタディを行い、無償資金協力にふさわしい計画の立案および計画の妥当性を検討する。調査の概要を示せば以下のとおりである。

(a) トルクメニスタンにおける研修実績の現況調査

(b) 農場内および改修道路沿い地形測量

(c) 建設材料調査

(d) 農業研修に対する阻害要因調査

(e) トルクメニスタン国における農業開発にとっての研修センターの位置付けおよび任務に関する検討

(f) 研修センターの運用計画の検討

(g) 研修センターの基本概念の検討

- 研修組織改善案の検討
- 研修の基本およびプログラムの検討
- 研修カルキュラムの検討
- 施設計画の設定
- 施設の段階的設立計画の設定

(h) 施設予備設計

(i) 施設の維持管理計画の設定

(j) 工事費見積りおよび工事計画

(k) 計画の妥当性検討

2.4 総合所見

(1) 事業の特徴と意義

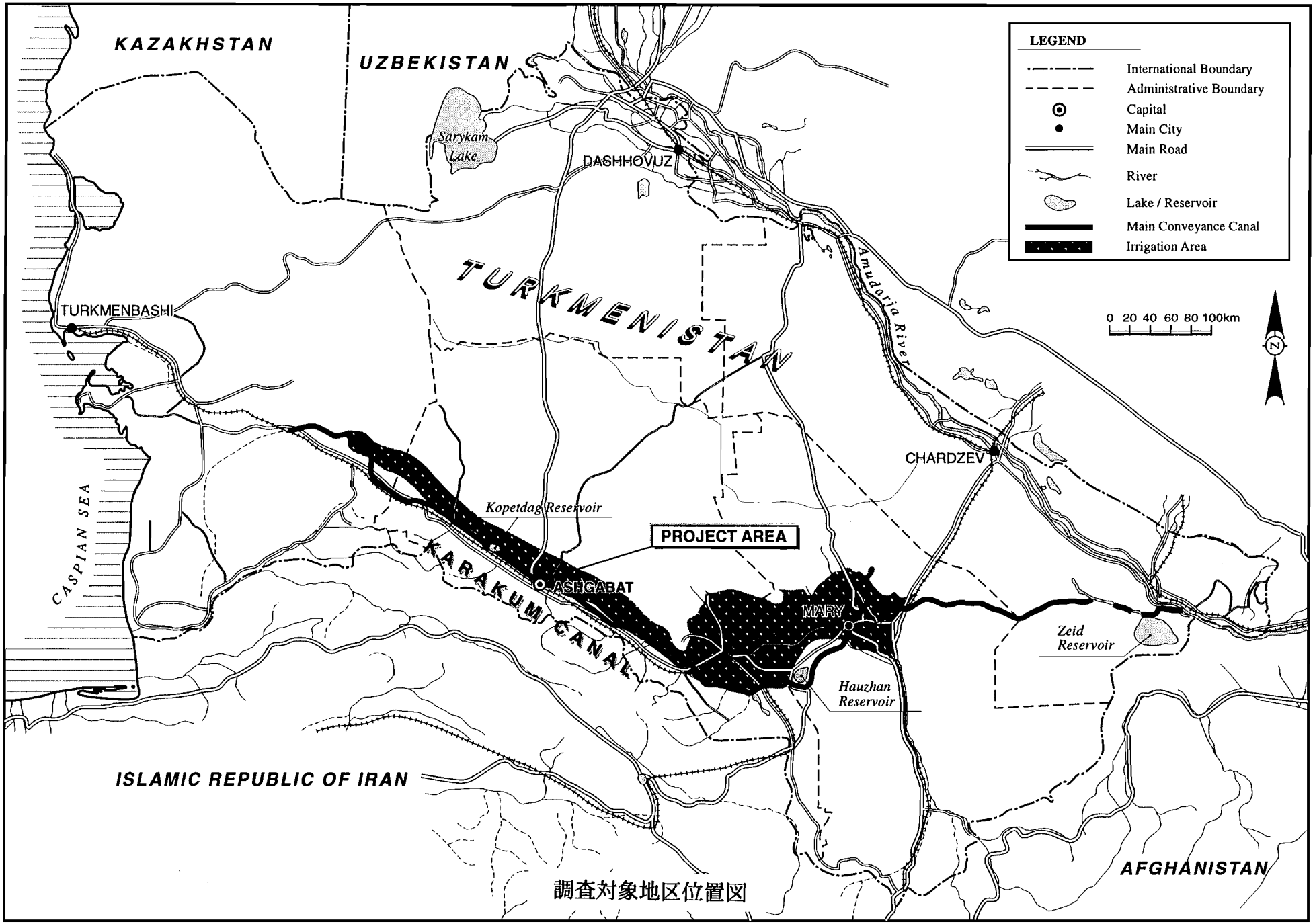
トルクメニスタン国では、他の CIS 諸国と同様、計画経済下で農業技術情報と農場の運営は集中管理されていたので、市場経済に移行した現在でもこの方式は依然として存在しており、西側諸国で見られるような農民研修および農業普及サービスは見られない。しかしながら、計画経済より市場経済への移行期にあるこの国の農業発展にとって、市場経済下の農業に適合するような農民研修および農業普及組織を作ることは成功への鍵である。市場経済下の農業にと

って、時を得た正確な情報と適切な訓練は、この国の農業の競争力の強化と収益向上のために必要欠くべからざるものであるにも拘わらず、このような情報伝達、農民の訓練はこの国には存在しない。従って、農場の一般労働者は圃場管理、流通、農業経済、水管理、ビシネス計画、会計および最も重要な法制度に対する知識は殆ど無いに等しい。

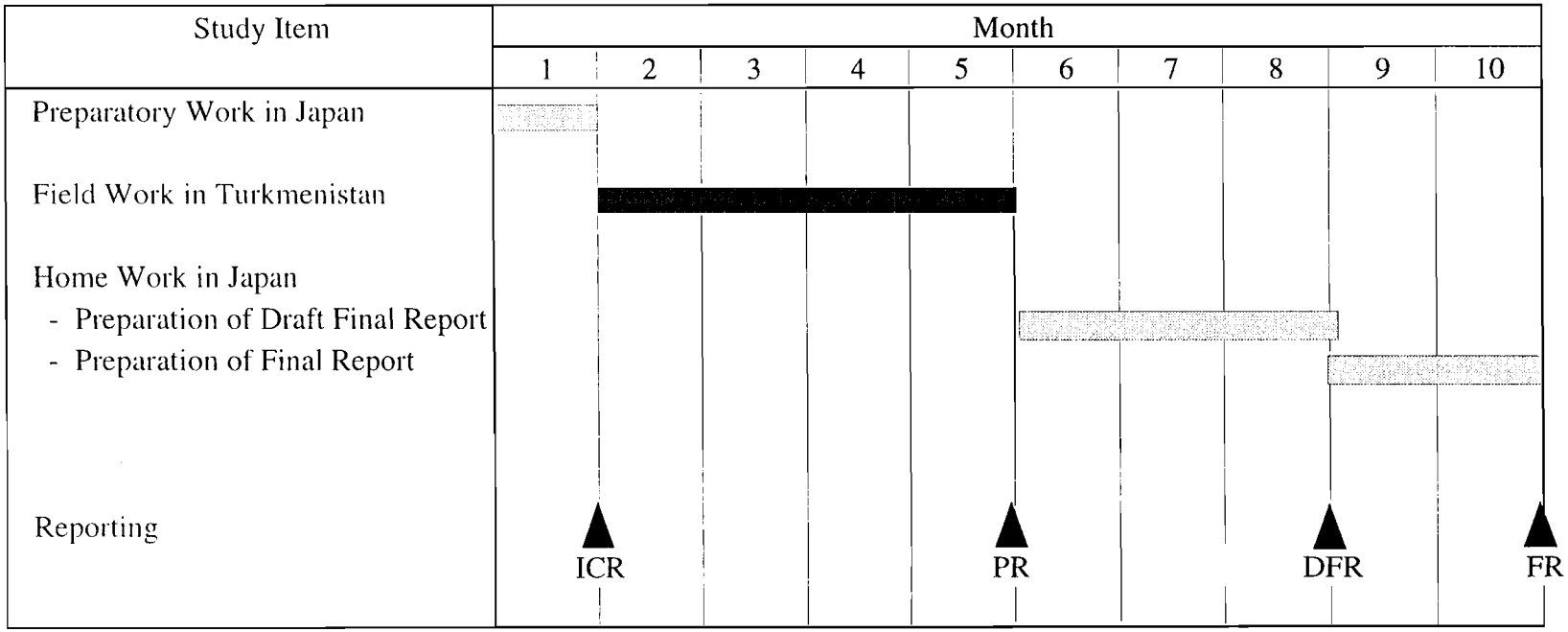
このような状況を市場経済下で改善すべく、政府はトルクメニスタン農業大学の管理の下、農民のみならず農民訓練および農業普及に携わる農業・水資源省職員の訓練の場を早急に創りたいとしている。しかしながら、現在政府には本件に関する確たる構想がないことから、本計画実施前に、開発調査を通して問題点を指摘し、開発方針を提案することは意義がある。

(2) 相手政府の意向

今回の調査時に面談した農業・水資源省次官（トルクメニスタン農業大学学長を兼務）によれば、現在計画中の研修センターを設立することにより、農業・水資源省職員および農民リーダーを多く養成したいとしている。この事業実現のために、農業研修および普及員養成に深い経験を持つ日本の技術を導入したいとし、日本政府の資金援助および日本の専門家派遣を強く望んでいる。このような背景から、ADCA 調査団としても当事業を日本政府の優良な ODA 案件として採り上げることが望ましいと判断する。


KAZAKHSTAN
UZBEKISTAN
TURKMENISTAN
ISLAMIC REPUBLIC OF IRAN
AFGHANISTAN
CASPIAN SEA
Sarykam Lake
DASHHOVUZ
TURKMENBASHI
Amudaria River
CHARDZEV
Kopetdag Reservoir
PROJECT AREA
KARAKUM CANAL
ASHGABAT
MARY
Zeid Reservoir
Hauzhan Reservoir
LEGEND
International Boundary
Administrative Boundary
Capital
Main City
Main Road
River
Lake / Reservoir
Main Conveyance Canal
Irrigation Area
0 20 40 60 80 100km
N

調査対象地区位置図



調査スケジュール（案）

図-III.2

3. 農業情報センター設立計画

3.1 計画の背景

1991 年に独立を宣言したトルクメニスタンは、その後急速に市場経済への移行を推進した。市場経済への移行と同時に農業部門においても、民主化路線を推進してきたが、これは結果として農業部門への国家予算の削減をもたらし、農業生産の減少を招く結果となった。この事態を憂慮した政府は、農業の振興を国家開発計画の重点項目として採り上げ、その手始めとして農業省内に情報管理センターを設立し、散在している農業関連資料・情報を管理することにより、今後の農業開発計画策定に活用することを計画している。

この情報センターでは経年的に農業資料を蓄積し、分析することによって、農業開発上の問題点、優先的な開発項目の把握等が可能になり、より制度の高い計画の立案が可能になる。特に水資源の問題から耕地面積が限定されているトルクメニスタンにおいては、面的な開発ではなく、技術向上や集約化といった質の向上を図る農業開発の策定が今後必要となり、より精度の高い農業情報が要求される。トルクメニスタン政府はこの点を十分認識しており、農業情報整備のためのハード、ソフト両面の技術援助を強く望んでいる。

3.2 計画の概要

(1) 目的

本計画の目的は、農業・水資源省内に農業情報センターを設立し、独立後管理の不行き届きで散在している農業関連資料・情報を集積し、今後の農業開発計画策定および農業振興に活用しようとするものである。その具体的内容は以下に示すとおりである。

(a) 全国を対象とした土地利用、土地所有、農法、水資源と灌漑施設、農業政策、農業研究成果、市場開発、農産物および畜産物の需要と供給および農産加工法等を対象とした農業情報システムの構築

(b) 農業・水資源省の地方局および関連機関で行っている農業研究結果のモニタリング・システムの構築

(c) 農法に関する正確且つ最新な情報を農民に速やかに伝達するシステムの導入

(d) 農業・水資源省と大学、専門学校、国際および国内の農業研究所、農業統計局等との情報交換システムの構築

(e) 農業研究および情報収集に関する農業・水資源省の地方局および関連機関職員への支援

(f) 研究成果および農業統計を共有するための研修およびセミナーの開催

(g) 農民の収益性向上を目的として研究成果および農産物動向に関する定期的刊行物の発行

(2) 農業情報センターの施設内容

農業情報センター設立と運用にとって、以下の施設および作業が必要となろう。

(a) データ・ベース保管場所および作業室を含む管理事務所

(b) 農業・水資源省と大学、専門学校、国際および国内の農業研究所、農業統計局間のコンピューター・ネットワークの構築

(c) ハードおよびソフトを含むコンピューターセット供与

(d) 実作業を通しての所員の研修

(e) 所員の海外研修

3.3 開発調査

(1) 調査対象地区

アシュガアード市内農業・水資源省（図-III.3 参照）

(2) 調査内容および調査期間

図-III.4 に示す如く、9 ヶ月間をかけてフェージビリティ・スタディを行い、無償資金協力にふさわしい計画の立案および計画の妥当性を検討する。調査の概要を示せば以下のとおりである。

(a) 以下の項目を含むトルクメニスタンにおける統計処理および情報システムの現況調査

- 過去および現在の統計収集活動の状況
- 統計資料処理の現況
- 情報伝達システムの現況

(b) 農業研究所の現況調査

- 各農業研究所のインベントリー調査
- 農業研究の管理および情報伝達システム
- 農業研究の過去および現在における活動状況
- 農業研究のモニタリング状況

(c) 農業・水資源省と大学、専門学校、国際および国内の農業研究所、農業統計局等との情報交換システムの現況調査

(d) 農業研究と農業普及間の連携状況調査

(e) 通信網の現況調査

- 国内通信網
- 農業・水資源省本部と地方局および農業研究所間の通信網

(f) 現況農業情報システムの阻害要因調査

(g) 農業情報システム構築のための基本計画の設定

- 情報管理に関する政府組織の改善計画
- 施設計画
- 情報システムの段階的設立計画

(h) 施設の予備設計

(i) 施設の運用、維持管理計画の立案

(j) 事業費算定

(k) 事業の妥当性検討

(l) 事業実施計画の作成

上記調査に加えて、農林業分野においても、土地利用調査、広域収量調査、作物の生育状況調査、自然被害調査等に人工衛星を利用した衛星リモートセンシング技術が活用されていることから、この技術の導入の可能性/必要性についても検討を行う。また、様々な情報を地図上に表現できる地理情報システム (GIS)を利用しての総合的な土地情報システムの構築についても検討を加える。

3.4 総合所見

(1) 事業の特徴と意義

トルクメニスタンでは、現在農業関係の正確なデータの把握が為されていないため、土壌、土壌分級、土地利用、作物別作付け面積、収量、収穫面積等の正確な農業統計、農業研究成果、農産物市場価格等を把握するための農業情報収集技術の援助を日本政府に期待している。これらの農業情報システム整備は、将来の農業開発および地域開発計画策定に大いに役立つものである。また、提案した農業情報センターは、トレーニング・センターとしての機能も持っているため、トルクメニスタンの技術者を育成すると共に、トレーニングを受けた技術者によって事業が運営され、全国の農業情報の整備を推進するものと期待される。このように、本計画はトルクメニスタン政府のニーズも高く、技術援助としても妥当なものと期待される。また、現在の衛星リモートセンシング技術を用いれば、広範囲の地域に対して、高い精度で土地利用状況等を把握することができ、これを地理情報システム上で組み合わせれば、より総合的に利用が可能なデータ・ベースとなると考えられる。従って、調査の段階で衛星リモートセンシング技術と地理情報システムの可能性/必要性と導入の時期を検討することも必要となろう。

(2) 相手政府の意向

今回の調査で面談した農業・水資源省次官によれば、農業情報システムの拡充は今後のトルクメニスタン国の農業発展のために必要不可欠な分野であり、農業情報システムの整備/拡充が急務であるという認識を持っており、早期実現を希望している。また、農業・水資源省は本事業に対して情報先進国である日本政府の技術および資金援助を望んでおり、ADCA 調査団としても、本事業が単に農業情報システムの拡充とハード、ソフトの整備に留まらず、トレーニングによる技術者の育成・養成を通して、トルクメニスタンの人的資源の開発にも大きく寄与することを考慮し、本事業を日本政府の優良な ODA 案件として採り上げることが望ましいと判断する。

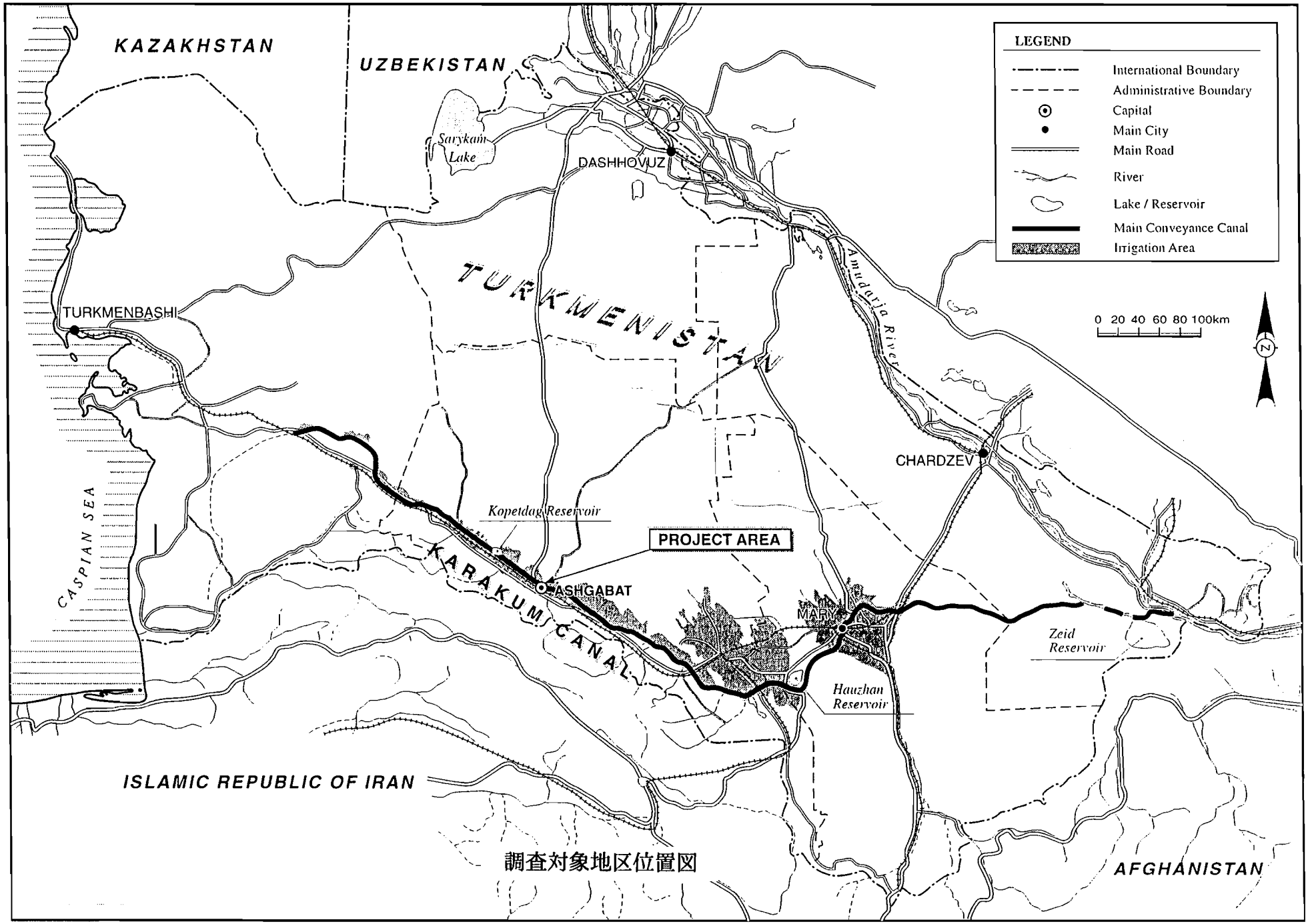
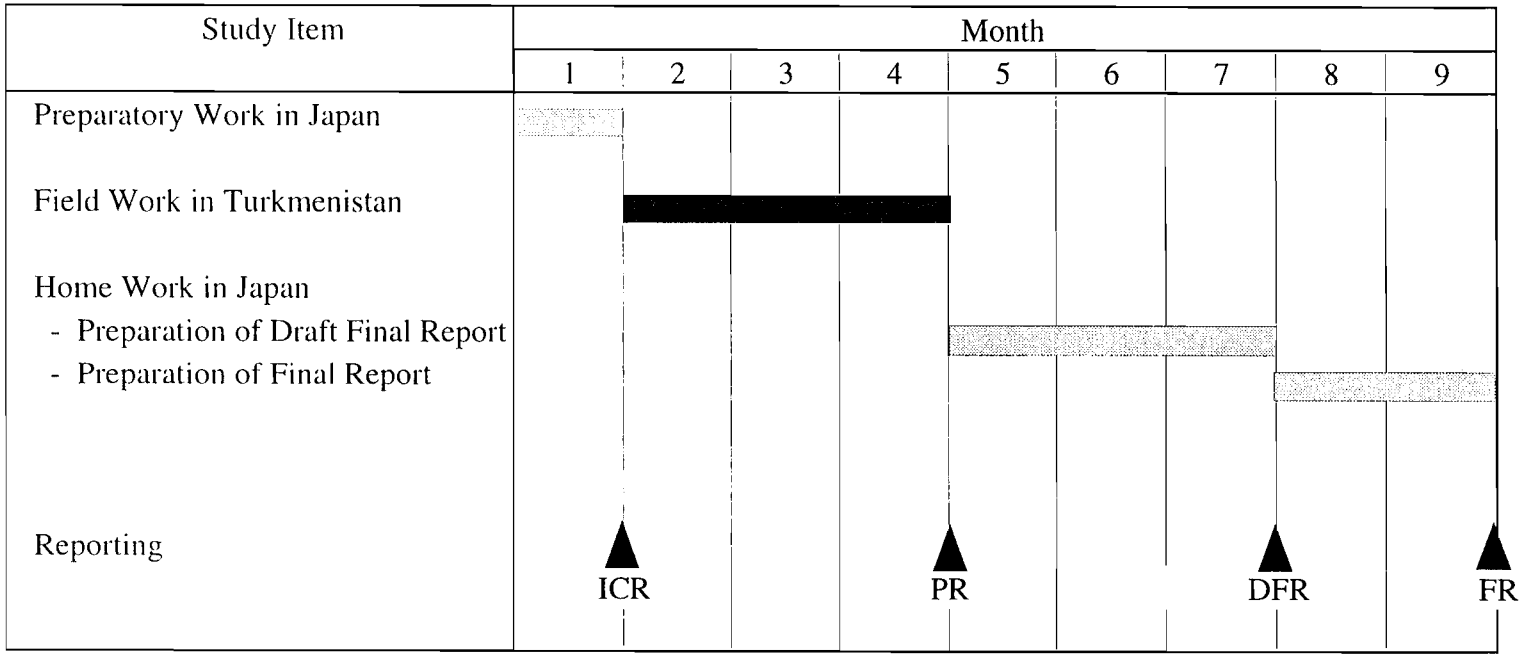

KAZAKHSTAN
UZBEKISTAN
TURKMENISTAN
ISLAMIC REPUBLIC OF IRAN
AFGHANISTAN
CASPIAN SEA
Sarykam Lake
DASHHOVUZ
TURKMENBASHI
Amudarja River
CHARDZEV
Kopetdag Reservoir
PROJECT AREA
KARAKUM CANAL
ASHGABAT
MARY
Zeid Reservoir
Hauzhan Reservoir
LEGEND
International Boundary
Administrative Boundary
Capital
Main City
Main Road
River
Lake / Reservoir
Main Conveyance Canal
Irrigation Area
0 20 40 60 80 100km
N
調査対象地区位置図

図-III.3



Note:
: Work in Turkmenistan
: Work in Japan

ICR : Inception Report
PR : Progress Report
DFR : Draft Final Report
FR : Final Report

調査スケジュール（案）

図-III.4

付属資料

A. 「アルマティ州農産物生産基盤・流通システム整備計画」開発調査要請書（ドラフト）
B. 「新首都近郊農業・農村開発計画」開発調査要請書（ドラフト）
C. 「コクサライ・ダム灌漑農業・環境改善計画」開発調査要請書（ドラフト）
D. 「フェルガナ州排水改良・貧困地域農業振興計画」開発調査要請書（ドラフト）
E. 「トルクメニスタン農業大学農業訓練センター設立計画」開発調査要請書（ドラフト）
F. 農業情報センター設立計画」開発調査要請書（ドラフト）

TECHNICAL COOPERATION
BY
THE GOVERNMENT OF JAPAN

APPLICATION

by
The Government of The Republic of Kazakstan
for
Feasibility Study
on
Improvement of Agricultural Infrastructure
and Marketing System in Almaty Municipality
to
The Government of Japan

1. Project Digest

1.1 Project Title

Project for Improvement of Agricultural Infrastructure and Marketing System for Agricultural Products in Almaty Municipality

1.2 Location

Almaty Municipality, of which location map is presented in **Attachment - 1**.

1.3 Implementing Agency

Almaty Municipal Government

1.4 Desirable Implementation Schedule

(a) Feasibility Study : Approximately 18 months from the middle of 2000 including the master plan period of 10 months.

(b) Implementation : Approximately two (2) years from 2003

1.5 Prospective Funding Sources

(a) Feasibility Study (grant) : Japan International Cooperation Agency (JICA)

(b) Implementation (grant) : Japan International Cooperation Agency (JICA)

2. Background and Justification of the Project

2.1 General

Kazakstan is a land-locked country in Central Asia bordering Russia to the north and northwest, Turkmenistan, Uzbekistan and Kyrgyzstan to the south, and China to the east, and is bounded by Caspian Sea in the west. The national territory is 2.72 million km^2 and extends 3,200 km east to west and 1,800 km north to south.

Kazakstan has a semi-arid continental climate with cold snowy winters and hot dry summers. Annual precipitation ranges from less than 150 mm in the north to 450 mm in the southern foothills. Kazakstan's land ranges from semi-arid steppes in the northern and central regions to desert and mountains along the southern borders with Uzbekistan and Kyrgyzstan. Most irrigated agriculture occurs in the south along the Syr Darya river. Crop land includes about 34 million hectares, of which about 32 million hectares is rain-fed and about 2.4 million hectares is irrigated.

According to the Statistical Bulletin 4 of 1998, the 1996 population of Kazakstan was 15.6 million (5.7 persons/km^2). Population peaked at 17.0 million in 1993 and since then it has been declining. The average annual growth rate for 1994-1998 in Kazakstan was -1.2%. This is due to both higher death rate than the average and emigration. The percentage of the population residing in urban areas is 59% with 41% residing in the rural sector. The population of Kazakstan is comprised of eight major nationalities or ethnic groups. The largest is Kazak which presently accounts for 46% of the population. The nation was a multi-ethnic pluralist, secular society during the Soviet Period. With independence in 1991, the population's ethnic structure began to change with the emigration of Russians, Ukrainians and Germans.

2.2 National Economy

The Kazakstan economy is slowly pulling out of recession, with GDP growth at 1.5% for 1996, and 3% for 1997 as shown in the following table:

Economic Indicator	1994	1995	1996	1997
Real GDP (%)	-25.4	-8.9	1.5	3.0
Industrial Production (%)	-28.5	-7.9	0.7	2.0
Consumer Prices (%)	1,900	175	45	30
Trade Balance* (US$ million)	-330.5	1,193.5	1,969.1	-
Average exchange rate *3 (tenge : $) (Aug.)	36	61	67	75

Fiscal and monetary policies have been held tight, with the result that the rate of inflation has been decreasing, and interest rates have declined. The oil and gas sector has recorded strong expansion and will continue to increase production, as foreign investment is

spurred in response to conclusion of a new pipeline deal. Energy arrears have continued to rise as has inter-enterprise debt.

Per capita GDP was US$699 in 1994, US$1,003 in 1995, and US$1,276 in 1996. By the end of March 1996, 206,000 people were registered as unemployed; 4.2% of the work force. However, taking into consideration people who are on unpaid leave, working without pay, or otherwise not registered, the real unemployment rate is probably 15%.

The annual trade balances for the period from 1993 to 1996 are shown in the following table:

(Unit: US million)

Year	Imports	Exports	Balance
1993	471.6	1,485.5	1,013.9
1994	3,561.2	3,230.7	-330.5
1995	3,781.0	4,974.5	1,193.5
1996	4,261.3	6,230.4	1,969.1

The major exports of Kazakstan are minerals, base metals, and vegetable products. Major imports are also minerals and base metals along with machinery and appliances. Kazakstan's major trading partner is the Russian Federation which accounted for 48.9% of external trade in 1996. Other CIS countries are next in importance as trading partners.

2.3 Agricultural Sector

Agriculture has long been a significant sector in Kazakstan's economy. In 1994, it counted for 28% of Gross Domestic Product (GDP) and provided employment to over 23% of total employment. About 200 million hectares, or 75 percent of Kazakstan's total area, is used for cropping and grazing. Cropped land covers 34 million hectares, of which 32 million hectares is rainfed and about 2.4 million hectares is irrigated. Cereals cover about 62% of total cropped area with fodder crops, vegetables and industrial crops accounting for most of the rest.

Since dissolution of the former Soviet Union, the financial position of most farms has deteriorated markedly in the past five years, with a sharp increase in the number of farms reporting losses. The losses have been largely due to official pricing and marketing policy that depressed producer prices well below world market levels, while the prices of inputs were liberalized and increased. Under this condition, fertilizer application has dropped year by year, fuel shortages have disrupted planting and harvesting activities, and worn-out farm machinery has not been replaced. As a result, planting area has decreased and the yields of crops have dropped, causing sharply decreased production as shown below.

(Unit: '000 tons)

Crop	1986-90*1	1991	1992	1993	1994	1995	1996
Wheat	13,663	6,889	18,285	11,585	10,033	6,490	7,678
Barley	6,737	3,085	8,510	7,148	5,871	2,208	2,695
Paddy	590	521	467	403	282	183	226
Maize	493	330	367	355	233	136	122
Sugar beat	1,431	726	1,160	843	433	341	371
Sunflower	117	108	122	86	97	99	64
Cotton	321	291	252	200	160	223	183
Vegetables	3,676	3,401	3,842	3,286	2,967	2,498	2,436

2.3 Problems To Be Solved in Agricultural Sector

As mentioned above, performance in agriculture has been declining heavily since dissolution of the former Soviet Union, particularly in the recent five years. The Government, recognizing this crucial situation of the sector, has been emphasizing:

(i) Price and trade policy.

(ii) Marketing reform.

(iii) Farm privatization and restructuring of the state enterprises.

(iv) Improvement of agricultural productivity.

In addition to the above mentioned measures, a particular importance should be placed on the improvement of agricultural infrastructure and marketing system for agricultural products for the profitable and sustainable agricultural development. The production of fruits and vegetables has suddenly increased and these crops are becoming important as the materials for processed food and fresh vegetables. However, due to the facts that all these processing facilities are old and the marketing system is mal-functioning, the quality of processed food is low and there is a big loss, more than 30%, in marketing system. For the profitable agricultural development, therefore, renewal of agro-processing facilities and improvement of marketing system is of great importance.

2.3 Outline of the Project

(1) Objectives of the Project

The main objective of the project is to establish the profitable production base and efficient marketing system for agricultural products mainly of fruits and vegetables. To sustain and accelerate the objective, the project needs to address the following issues:

(a) Strengthening of the production system through efficient use of lands, improvement of farm technology and appropriate management and conservation of land and water resources through rehabilitation of irrigation and drainage system and land consolidation.

(b) Strengthening of marketing system through price stabilization, provision of rural market infrastructure, promotion of market development and organization and establishment of rule and regulation.

(c) Strengthening of support services and facilities by ensuring credit accessibility and savinings mobilization in the rural areas, improving extension, information and other support services, promoting social industries, minimizing agricultural risks and strengthening farmers' organization.

(2) Project Components

The project will consist of the following components:

(a) Improvement of agricultural infrastructure including rehabilitation of irrigation and drainage facilities, land consolidation and farm road network.

(b) Establishment of storage and distribution centers at the raion (district) level including the installation of loading/unloading facilities, selecting/grading facilities, packing facilities, and construction of store houses and offices.

(c) Rehabilitation and upgrading of existing market center in Almaty, installation of loading/unloading facilities and weight measuring facilities and establishment of market information center.

3. Terms of Reference of the Proposed Study

The terms of reference for master plan and feasibility study for the project is presented in **Attachment - 2**.

4. Facilities and Information for the Study Team

(1) Assignment of Counterpart Personnel of the Executing Agency for the Study

Almaty Municipality will assign counterpart personnel to meet the requirement of the JICA Study Team.

(2) Available data, Information, Documents, Maps etc. Related to the Study

- Meteo-hydrological data
- Topographic maps on a scale of 1:50,000 and 1:250,000
- Soil and geological maps on a scale of 1:50,000 and 1:250,000
- Cadastral maps on a scale of 1:50,000
- Agricultural statistics
- Production year book

- Previous study reports
- All information available at the offices relevant to the project

(3) Information on the Security Conditions in the Study Area

There is no security problem in the study area as well as in Almaty area.

5. Global Issues

(1) Environmental Issue

The environmental impact assessment should be done within a framework of the Study in order to formulate a plan with the minimum adverse effects on natural and social environment and mitigation measures.

(2) Women in Development

Women constitute overwhelming majority of farmers in Kazakstan. The Government makes a deliberate effort to ensure the place of women in the mainstream of development. Therefore, the Study will verify the need for more involvement of women and the constraints they face. The proposed plan should be formulated with a particular attention to women in development.

(3) Poverty Reduction Components of the Project

Farmers' economy would be largely improved as a result of improvement of agricultural infrastructure and marketing system improvement.

(4) Any Constraints against the Low Income People Caused by the Project

None.

6. Undertakings of the Almaty Municipal Government

In order to facilitate smooth and efficient execution of the Study, the Almaty Municipal Government shall undertake to:

(a) Secure the safety of the Study Team.

(b) Permit the members of the Study Team to enter, leave and sojourn in the country in connection with their assignment therein, and exempt them from alien registration requirement and consular fees.

(c) Exempt the Study Team from taxes, duties and any other charges on

equipment, machinery and other materials brought into and out of the country for conducting the Study.

(d) Exempt the Study Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Study Team for their services in connection with implementation of the Study.

(e) Provide necessary facilities to the Study Team for remittance as well as utilization of funds introduced into the country from Japan in connection with implementation of the Study.

(f) Secure permission or entry into private properties or restricted areas for the conduct of the Study.

(g) Secure permission for the Study Team to take all data, documents and necessary materials relating to the Study out of the country to Japan.

(h) Provide medical services as needed. Its expenses will be chargeable to the member of the Study Team.

The Almaty Municipal Government shall bear claims, if any arises against member (s) of the Study Team resulting from, occurring in the course of or otherwise connected to the discharge of their duties in implementation of the Study, except when such claims arise from gross negligence or wilful misconduct on the part of the member(s) of the Study Team.

The Almaty Municipal Government shall act as counterpart agency to the Study Team and also as coordinating body in relation with other governmental and non-governmental organisations concerned for smooth implementation of the Study.

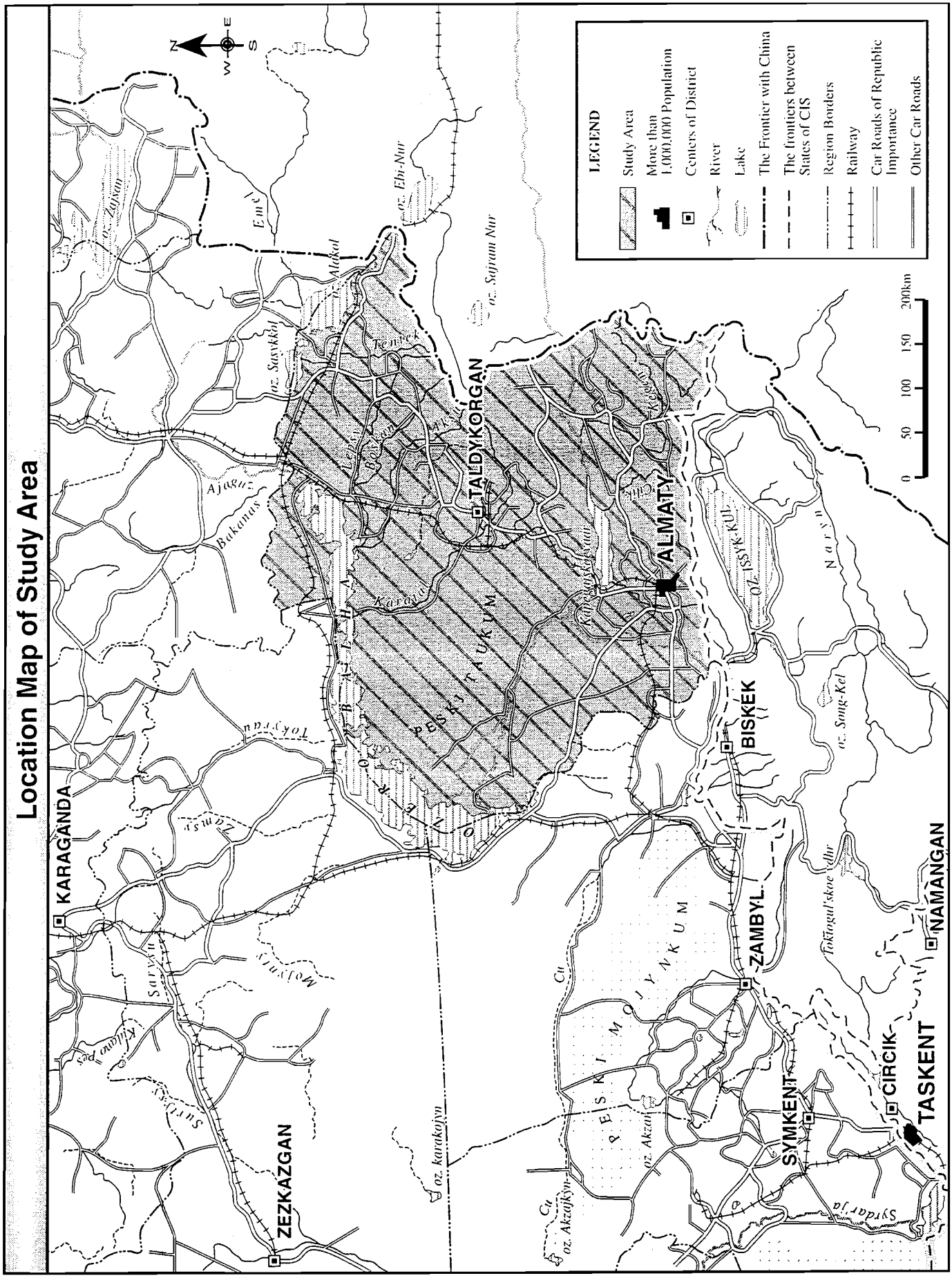
The Almaty Municipal Government assured that the matters referred in this form will enable smooth execution of the Development Study by the Study Team.

Signed:

Titled:

On behalf of the Almaty Municipal Government

Date:


Location Map of Study Area
LEGEND
Study Area
More than 1,000,000 Population
Centers of District
River
Lake
The Frontier with China
The frontiers between States of CIS
Region Borders
Railway
Car Roads of Republic Importance
Other Car Roads
0 50 100 150 200km
KARAGANDA
ZEZKAZGAN
TALDYKORGAN
ALMATY
BISKEK
ZAMBYL
SYMKENT
CIRCIK
TASKENT
NAMANGAN
PEDESTAUKUM
PESKI MOJYNKUM
oz. Ebi-Nur
oz. Sajram Nur
oz. Alakol
oz. Sasykkol
oz. Zajsan
oz. karakojyn
oz. Akzajkyn
oz. Akzar
oz. Issyk-Kul
oz. Sonq-Kel
Emel
Ajaguz
Bakanas
Lepsi
Boyram
Aksu
Karoual
Kaskelen
Chu
Toqyrau
Zamsy
Sarysu
Kuanyspes
Surtjsu
Moiynty
Toktogul'skoe Vdhr
Syrdar'ja
Cu

Attachment - 2

Terms of Reference
for
Feasibility Study
on
Project for Improvement of Agricultural Infrastructure and Marketing System for Agricultural Products
in
Almaty Municipality

1. Rationale

There is a strong need to improve the agricultural infrastructure and marketing system for agricultural products, particularly for fruits and vegetables, in Almaty Municipality. The project area has a most important marketing activities in Kazakstan from the geographical viewpoint.

In order to formulate the Project for Improvement of Agricultural Infrastructure and Marketing System for Agricultural Products in Almaty Municipality, the feasibility study (hereinafter referred to as "the Study") is urgently required.

2. Justification of Japanese Technical Cooperation

Japan is known as one of the most advanced countries in the agricultural infrastructure and marketing system of agricultural products. If the master plan and the feasibility study are conducted under the Japanese technical cooperation, these advanced technologies will be introduced to Kazakstan through the Study.

3. Objective of the Study

The objectives of the Study are to formulate a strategic and comprehensive development master plan with a main emphasis on the review and proposal on marketing system covering the whole country and to carry out a feasibility study on the improvement of the agricultural infrastructure and marketing system in Almaty Municipality.

4. Study Area

The master plan study will cover the whole country and the feasibility study will deal with the Almaty Oblast including Almaty Municipality.

5. Scope of the Study

5.1 General

The scope of the Study will be as follows:

(a) Master plan study for the whole country.

(b) Feasibility study for the whole Almaty Oblast including Almaty Municipality.

The Study will be carried out in two phases. In the Phase-I, a master plan study will be carried including formulation of the proposed overall marketing system covering the whole country. In the Phase-II, a feasibility study will be made for the improvement of agricultural infrastructure and marketing system in the Almaty Oblast including Almaty Municipality.

5.2 Detailed Scope of the Study

(1) Phase-I

In order to formulate the overall marketing system covering the whole country, the following activities will be required:

(a) Collection, review of existing data and information:
- relevant existing studies and reports,
- national and regional agricultural development plans,
- social and economic statistics,
- agricultural statistics, and
- existing road and railway networks.

(b) survey and study on:
- existing fruit and vegetable production and marketing systems, including processing thereof,
- identification of objective beneficiaries, their socioeconomic status and their need for development in both production and consumption zones,
- work responsibilities by different types in production and marketing of fruits and vegetables,
- activities of existing organizations, cooperatives and NGO's related to the Study,
- agricultural and financial support services available in the Study Area and

accessibility to them by the objective beneficiaries,

- possible impacts of the project on fruit and vegetable production and fruit and vegetable marketing system, and
- institutional capacity of government agencies concerned with the Study.

(c) Formulation of master plan including:

- assessment and identification of marketing constraints from farmer producers' and consumers' viewpoints,
- formulation of basic concept for improvement plan for marketing system,
- estimation of preliminary costs and benefits, and
- evaluation of economic viability of the project.
- justification for the improvement of agricultural infrastructure and marketing system for agricultural products in Almaty Oblast including Almaty Municipality.

(2) Phase-II

On the basis of the results of the master plan made in the Phase-I, the following work will be carried out for feasibility study on the Improvement of Agricultural Infrastructure and Marketing System for Agricultural Products in Almaty Municipality:

(a) Collection of supplementary data and information,

(b) Topographic survey and other necessary study and preliminary design of agricultural infrastructure, marketing installations and storage and distribution centers,

(c) Formulation of plan for improvement of the agricultural marketing system that includes the following components:

(i) Plan for marketing installations at places of consumption;

- identification of the places,
- identification and design of necessary installations and equipment, and
- preparation of basic concept for administration of new market.

(iii) Plan for storage and distribution centers at the places of production, including renewal of the existing centers, which includes;

- identification of the places,
- identification and design of necessary installations and equipment, and

- preparation of basic concept for administration of storage and distribution centers.

(d) Estimation of the project cost and project evaluation from economical and financial viewpoints.

5.3 Transfer of Technology

Throughout the course of the Study, transfer of technology and training will be provided to counterpart experts by foreign experts in the following fields:

(a) Field survey and investigation for every line of foreign experts assigned.

(b) Formulation of marketing system and plan and design for agricultural infrastructure and marketing facilities.

The above transfer of technology will be carried out in the form of on-the-job training and seminar during the course of the Study. In addition to the above transfer of technology, overseas training will also be programmed preferably in Japan.

5.4 Study Schedule

The period required for the Study is estimated at 18 months in total for two phases: 8 months for the Phase-I and 10 months for the Phase-II, as shown in **Figure 1**.

The following foreign experts will be required for the Study:

- Team Leader
- Regional Economic Planner
- Agronomist
- Agro-economist
- Institutional Expert,
- Marketing Expert
- Irrigation and Drainage Engineer,
- Transportation Engineer,
- Marketing Facilities Expert
- Land Use / Soil Expert

The required manpower input is estimated to be 80 man-months in total.

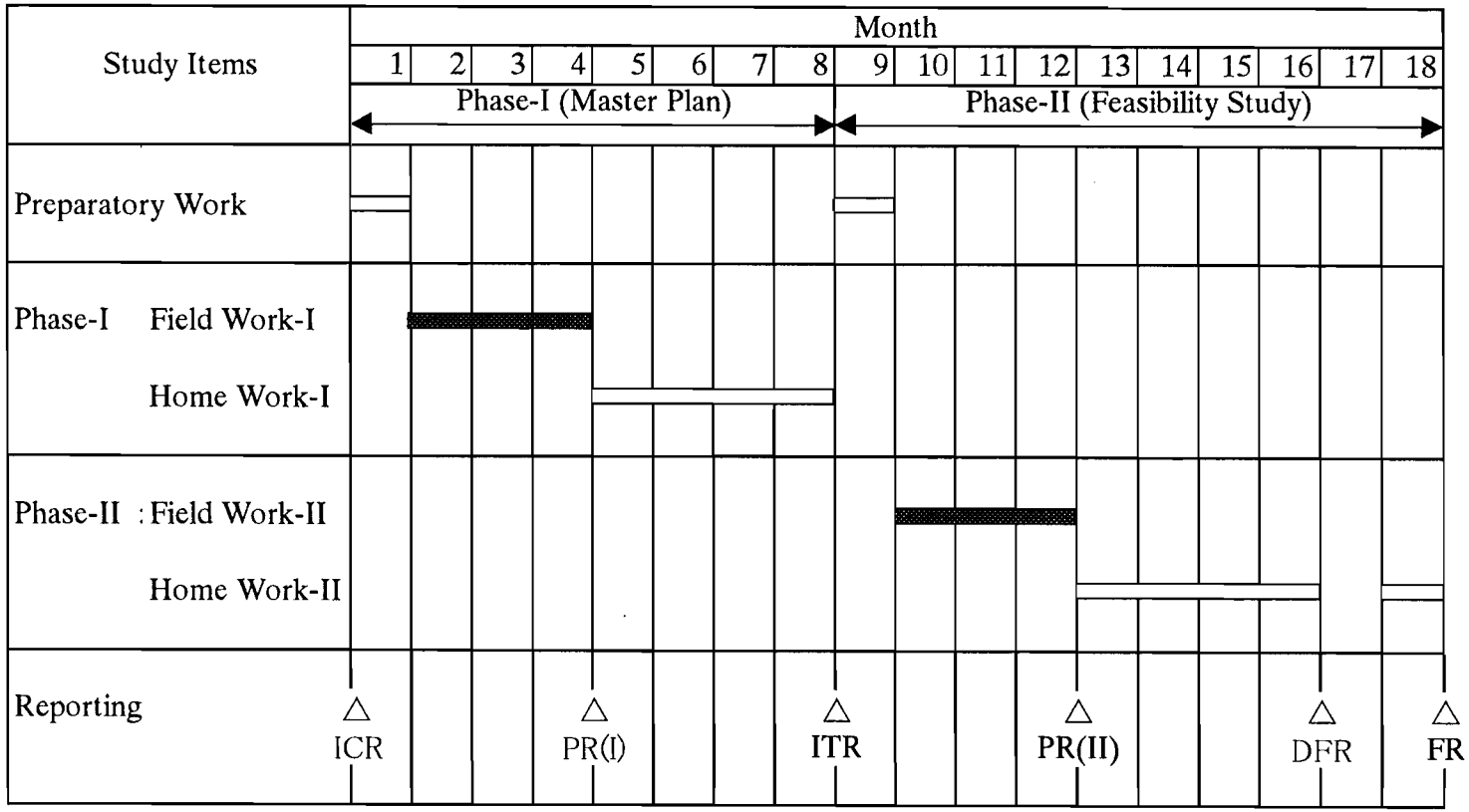
5.5 Expected Major Outputs of the Study

The major outputs of the Study are expected to be (i) formulation of master plan for the whole country with the justification for the improvement of agricultural infrastructure and marketing system for agricultural products in Almaty Municipality as the priority

project, and (ii) feasibility study including the project evaluation from the technical and economical viewpoint and the implementation program for the priority project. These study results will be compiled in the following reports which will be submitted to the Almaty Municipal Government.

Inception Report	:	Within one month after start of the Phase-I Study.
Progress Report (I)	:	At the end of the field work of the Phase-I Study.
Interim Report	:	At the end of the Phase-I Study.
Progress Report (2)	:	At the end of the field work of the Phase-II Study.
Draft Final Report	:	At the end of the Phase-II Study.
Final Report	:	Within one month after getting the comments of the Almaty Municipal Government on the Draft Final Report.

Tentative Work Schedule



Note:
- Work in Kazakstan
- Work in Japan

ICR : Inception Report
PR(1) : Progress Report (1)
ITR : Interim Report
RR(2) : Progress Report (2)
DFR : Draft Final Report
FR : Final Report

Figure – 1

Application
For
The Technical Cooperation (Development Study)
By
The Government of Japan

1. Project Digest

1.1 Project Title

Astana Urban Agriculture and Rural Development Project

1.2 Location

Astana City and three districts (Rayon) of Shortandy, Tselinograd and Arshaly in Akmola Oblast (Region), of which location map is shown in Attachment –1.

1.3 Implementing Agency

Ministry of Agriculture, Republic of Kazakstan

1.4 Desirable Implementation Schedule

(a)	Feasibility Study:	Approximately 21 months from mid 2000
(b)	Implementation:	Approximately two (2) years from 2003 for the urgent works of the Project

1.5 Prospective Funding Sources

(a)	Feasibility Study (grant):	Japan International Cooperation Agency (JICA)
(b)	Implementation (grant):	Japan International Cooperation Agency (JICA) for the urgent works of the Project

2. Background and Justification of the Project

2.1 General

Kazakstan is a land-locked country in Central Asia bordering Russia to the north and northwest, Turkmenistan, Uzbekistan and Kyrgyzstan to the south, and China

to the east, and is bounded by Caspian Sea in the west. The national territory is 2.72 million km^2 and extends 3,200 km east to west and 1,800 km north to south.

Kazakstan has a semi-arid continental climate with cold snowy winters and hot dry summers. Annual precipitation ranges from less than 150 mm in the north to 450 mm in the southern foothills. Kazakstan's land ranges from semi-arid steppes in the northern and central regions to desert and mountains along the southern borders with Uzbekistan and Kyrgyzstan.

According to the Statistical Bulletin 4 of 1998, the 1998 population of Kazakstan was 15.6 million (5.7 persons/km^2). Population peaked at 17.0 million in 1993 and since then it has been declining. The average annual growth rate for 1994-1998 was –1.2%. This is due to both higher death rate than the average and emigration. The percentage of the population residing in urban areas is 59% with 41% in the rural sector.

The Kazakstan economy is slowly pulling out of recession after 1994, with the gross domestic product (GDP) growth of 1.5% for 1996 and 3% for 1997. Kazakstan has adopted and started the implementation of a comprehensive structural reform program aimed at moving the country towards a market economy since the declaration of independence in December 1991. In May 1992, the Government announced the economic development strategy aimed at the accomplishment of a free market system within 15- 20 years.

2.2 Agricultural Sector

Agriculture has long been a significant sector in Kazakstan's economy. In 1997, it counted for 28% of GDP and provided employment to over 23% of total employment. About 200 million hectares, or 75% of Kazakstan's total area, is used for cropping and grazing. Cropped land covers 34 million hectares, of which 32 million hectares is rain-fed and about 2.4 million hectares is irrigated. The main crops cultivated in the country are wheat, maize and cotton, but their yields are very low; 0.97 tons/ha of wheat, 2.84 tons/ha of maize and 2.25 tons/ha of cotton, mainly due to less precipitation, 250 mm per annum on an average. Live stock breeding is also an essential economic activity in this country particularly for beef, mutton, dairy products and wool.

Since dissolution of the former Soviet Union, the financial position of most farm has deteriorated markedly in the past 7 years, with a sharp increase in the number of farms reporting losses. The losses has been largely due to official pricing and marketing policy that depressed producer prices well below world market levels. While the prices of inputs were liberalized and increased. Under this condition, fertilizer application has dropped year by year, fuel shortages have disrupted planting and

harvesting activities, and worn-out farm machinery has not been replaced. As a result, planting area has decreased and the yields of crops have dropped, causing sharply decreased production.

2.3 Problems To Be Solved in Agricultural Sector

As mentioned above, performance in agriculture has been declining heavily since dissolution of the former Soviet Union, particularly in the recent seven years. The Government, recognizing this crucial situation of the sector, has been emphasizing:

(a) Price and trade policy.

(b) Marketing reform.

(c) Farm privatization and restructuring of the state enterprises.

(d) Improvement of agricultural productivity.

In addition to the above-mentioned measures, a particular importance should be placed on the improvement of agricultural infrastructure and marketing system for agricultural products for the profitable and sustainable agricultural development. The production of fruits and vegetables has suddenly increased and these crops are becoming important as the materials for processed food and fresh vegetables particularly in and around large cities. However, due to the facts that all these processing facilities are old and the marketing system is mal-functioning, the quality of processed food is low and there is a big loss, more than 30%, in marketing system. For the profitable agricultural development, therefore, renewal of agro-processing facilities and improvement of marketing system is of great importance.

2.4 Outline of the Project

(1) Objectives of the Project

The main objectives of the Astana Urban Agriculture and Rural Development Project are to establish the profitable production base and efficient marketing system for agricultural products in and around Astana city, to enhance the farmers' living standard and to give a working opportunity to farmers in the area, which would prevent farmers from shifting to Astana city. To sustain and accelerate the objectives, the project needs to address the following issues:

(a) Strengthening of the production system through efficient use of lands, provision of wind protection forest, improvement of farm technology and appropriate management and conservation of land and water resources through improvement of irrigation system.

(b) Strengthening of marketing system through price stabilization, provision of rural market infrastructure, promotion of market development and organization and establishment of rule and regulation.

(c) Strengthening of support services and facilities by ensuring credit accessibility and savings mobilization in the rural areas, improving extension, information and other support services, promoting social industries, minimizing agricultural risks and strengthening farmers' organizations.

(2) Project Components

The project will consist of the following components:

(a) Improvement of agricultural infrastructure including improvement of irrigation and drainage facilities and farm road net work, and provision of wind protection forest.

(b) Improvement of rural infrastructure including village roads, drinking water supply and sewage facilities.

(c) Construction of marketing facilities in the producing sites and Astana city.

(d) Improvement of agricultural support services such as agricultural research, agricultural credit, and establishment of agricultural extension system.

(e) Establishment of agricultural cooperatives which will have the functions of marketing of agricultural products, procurement of farm inputs and rental of agricultural machinery to farmers.

(f) Establishment of an effective water management and O&M system.

3. Terms of Reference of the Proposed Study

The terms of reference for master plan and feasibility study for the project is presented in Attachment-2.

4. Facilities and Information for the Study Team

(1) Assignment of Counterpart Personnel of the Implementing Agency for the Study

The implementing Agency; Ministry of Agriculture, has a capacity to assign counterpart personnels corresponding to the number of Study Team to be organized by JICA.

(2) Available Data, Information, Documents, Maps, etc. Related to the Study

- Meteo-hydrological data,
- Topo maps on a scale of 1:25,000, 1:50,000 and 1:100,000,
- Soil maps on a scale of 1:100,000,
- Agricultural statistics,
- Production year book,
- Master plan report on "Construction of the Pipeline from Irtysh-Karaganda Canal to Upstream of the Ishym River for Water Supply of Astana City, and
- All information and existing study reports available at the offices relevant to the Project.

(3) Information on the Security Conditions in the Study Area

There is no security problem in the Study Area as well as in the capital city of Astana..

5. Global Issues

(1) Environmental Issue

The environmental impact assessment should be done within a framework of the Study in order to formulate a plan with the minimum adverse effects on natural and social environment and mitigation measures.

(2) Women in Development

Women constitute overwhelming majority of farmers in Kazakstan. The Government makes a deliberate effort to ensure the place of women in the main stream of development. Therefore, the Study will verify the need for more involvement of women and the constraints they face. The proposed plan should be formulated with a particular attention to women in development.

(3) Poverty Reduction Components of the Project

Farmers' economy would be largely improved due to increase of agricultural production after implementation of the project.

(4) Any Constraints against the Low Income People Caused by the Project

None

6. Undertaking of the Government of Kazakstan

In order to facilitate smooth and efficient execution of the Study, the Government of Kazakstan shall undertake to:

(a) Secure the safety of the Study Team.

(b) Permit the members of the Study Team to enter, leave and sojourn in the country in connection with their assignment therein, and exempt them from alien registration requirement and consular fees.

(c) Exempt the Study Team from taxes, duties and any other charges on equipment, machinery and other materials brought into and out of the country for conducting the Study.

(d) Exempt the Study Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Study Team for their services in connection with implementation of the Study.

(e) Provide necessary facilities to the Study Team for remittance as well as utilization of funds introduced into the country from Japan in connection with implementation of the Study.

(f) Secure permission or entry into private properties or restricted areas for the conduct of the Study.

(g) Secure permission for the Study Team to take all data, documents and necessary materials relating to the Study out of the country to Japan.

(h) Provide medical services as needed. Its expenses will be chargeable to the member of the Study Team.

The Government of Kazakstan shall bear claims, if any arises against member (s) of the Study Team resulting from, occurring in the course of or otherwise connected to the discharge of their duties in implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the member(s) of the Study Team.

Ministry of Agriculture shall act as counterpart agency to the Study Team and also as coordinating body in relation with other governmental and non-governmental organizations concerned for smooth implementation of the Study.

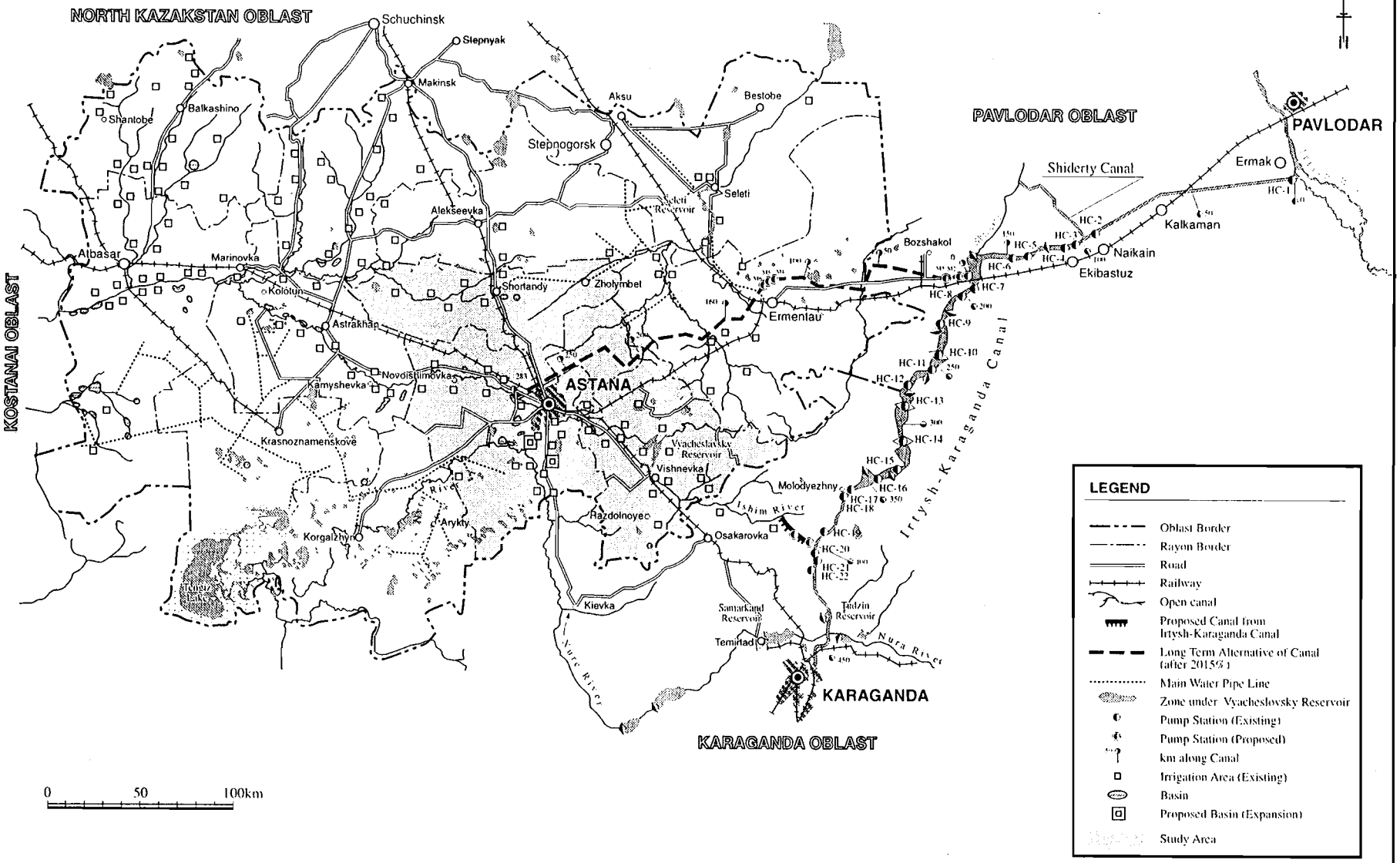
The Government of Kazakstan assured that the matters referred in this form will enable smooth execution of the Development Study by the Study Team.

Signed:

Titled:

On behalf of the Government of the Republic of Kazakstan

Date:



Location Map of Study Area

Attachment – 2

Terms of Reference
for
Feasibility Study
on
Astana Urban Agriculture and Rural Development Project

1. Background and Justification of the Study

Akmola Oblast is located in the northernmost part of the Kazakstan. This Oblast, having 13.3 million hectares of farm land has been the most important granary in Kazakstan. The total population of the Oblast was 2.2 million.

Astana city used to be a capital of this Oblast but has been the capital of the country since 1998. After transfer of capital from Almaty to Astana, the population of the new capital has rapidly been increasing, 280,000 persons in 1997 to 400,000 persons in 1999, and it is estimated that the population will reach 500,000 persons in 2005. Such a rapid increase of population will urgently need to take measures for supplying enough foods through the establishment of profitable production base and efficient marketing system for agricultural products in and around Astana city.

Akmola Oblast, in which Astana city and the three districts to be taken up as the Study Area is located, has a total farm land of 13.3 million hectares, of which about 5.6 million hectares (50%) are cultivated land. Of these cultivated lands, the irrigated land is only 48,500 hectares. The main crops cultivated in the Oblast are wheat and fodder crops in non-irrigated land and vegetables, potato and maize in irrigated land. The cultivated areas of respective crops are as shown below.

(Unit: ha)

Crops	1992	1993	1994	1995
Cereals	2,767	2,729	2,542	2,455
Potato	20	17	14	15
Vegetable	3	3	2	4
Sunflower	22	14	16	13
Fodder crops	1,057	998	954	839

The yields of these crops in the Oblast are very low as shown in the following table, because of deterioration of irrigation and drainage facilities, inferior farm management and less application of farm inputs caused by deficit of agricultural fund.

(Unit: ton/ha)

Crops	1992	1993	1994	1995
Cereals	1.6	0.9	0.7	0.6
Potato	1.6	0.9	0.6	0.6
Vegetable	12.1	7.3	8.9	6.6
Sunflower	0.1	0.1	0.2	0.2
Fodder crops	11.8	7.1	8.9	9.3

Under such a situation, the Government of Kazakstan has a plan to establish a profitable agricultural base and marketing system of agricultural products particularly for Astana city. Before implementing the work, however, the Government of Kazakstan intends to conduct a master plan study and feasibility study and wants to request the Japanese Government to conduct these studies through the JICA Technical Cooperation Program.

2. Justification of Japanese Technical Cooperation

Japan is known as one of the most advanced countries in the urban agriculture and rural development including the development of irrigated agriculture, agricultural supporting system, farmers' organizations, and marketing system. If the feasibility study is conducted under the Japanese technical cooperation, these advanced technologies will be introduced to Kazakstan through the Study.

3. Objectives of the Study

The objectives of the Study are to formulate a strategic and comprehensive master plan for the urban agriculture and rural development project in Astana city and the three districts of Shortandy, Tselinograd and Arshaly in Akmola Oblast and to carry out a feasibility study on the selected typical and priority project for balanced and systematic development.

4. Study Area

The master plan study will cover the whole territory of Astana city and the three districts of Shortandy, Tselinograd and Arshaly having a total farm land of 1.75 million hectares, of which a some 23,500 hectares are irrigated land, and the feasibility study will deal with about 3,000 - 5,000 hectares of the priority project.

5. Scope of the Study

5.1 General

The scope of the Study will be as follows:

(a) Master plan study for Astana city and the three districts of Shortandy, Tselinograd and Arshaly.

(b) Preparation of aerial photo and preparation of topographic map for the area of about 15,000 hectares of the priority area.

(c) Feasibility study for the priority project.

The Study will be carried out in three phases. In the Phase-1, a master plan study will be carried out covering the total area of Astana city and the three districts. In the Phase-II, the aerial photo shooting and mapping will be conducted for the priority area for the use of the feasibility study. In the Phase-III, a feasibility study will be made for the urban agriculture and rural development in the priority project area.

5.2 Detailed Scope of the Study

Phase-I: Master Plan Study

Field Work - I

(a) Data collection and review

(i) natural resources including topography, meteorology, hydrology, hydrogeology, salinity and soil,

(ii) socio-economy including population and number of households, social structure, income, living standards, national and regional development plans, national and regional economy and organizational structure of regional government,

(iii) agriculture including land use, cropped area, cropping pattern, crop varieties, unit yields, farming practices and land holding system,

(iv) agro-economy including prices of products, prices of farm inputs, marketing system and farm economy.

(v) irrigation and drainage including inventory list for existing irrigation and drainage facilities, design criteria, information of O&M and water management,

(vi) rural infrastructure including village road, domestic water supply system, post-harvest and storage facilities,

(vii) farms and farmers organizations and agricultural supporting system including farm management system, water management system, agricultural cooperative, agricultural research, agricultural credit system, extension and other supporting services, and

(viii) environment including water quality, wind havoc, ecosystem, and historical and cultural assets.

(b) Field survey and basic study including:

(i) hydrological survey including review of existing hydrological and water balance study for each farm,

(ii) hydrogeological survey including review of existing hydrogeological study, confirmation of existing well location, survey on present well conditions and check of water table and quality,

(iii) soil and land use survey including reconnaissance and soil survey to confirm the existing information shown in the existing soil maps and field check of present land use,

(iv) irrigation and drainage survey including survey on present irrigation and drainage networks.

(v) socio-economic survey including review of national and regional development plans, survey on social structure of villages, living standard of villagers and women's participation in social activities,

(vi) agricultural and agro-economic survey including interview survey to farmers for the collection of information on family size, farm economy, farming practices, marketing system, desire and intention to agricultural development, and survey on present conditions and constraints of the agricultural supporting services,

(vii) rural infrastructure survey including the survey on present conditions of village roads, domestic water supply system, sewage facilities, electric supply system, telecommunication system and post-harvest and storage facilities, and interview to villagers to hear their desire and intention,

(viii) construction material and cost survey including the survey on availability of construction materials and laborers and their unit prices,

(ix) environmental survey including survey on water pollution particularly for the Nura river and groundwater, wind havoc in farm land, ecosystem, and confirmation of endangered plant and animal species and historical and cultural assets, and

(x) preparation of Progress Report (I), which will describe the experts' activities, the results of field survey and basic consideration for the future study for the formulation of master plan.

Home Work - I

(a) Evaluation of development potential, needs and clarification of present constraints for the agricultural development in the Astana urban area.

(b) Formulation of development strategies consisting of:

(i) water resources plan including the assessment of surface water and groundwater potential and water balance study between the water demand and supply,

(ii) study on measures against salinization of agricultural land, if any,

(iii) agricultural development plan including recommendable crops and cropping pattern, modernized farming practices, expected farm income after implementation of the project, and improved marketing system and agricultural support system,

(iv) irrigation and drainage development plan including rehabilitation and improvement of existing irrigation and drainage system and on-farm development, and new construction of water-saving irrigation system,

(v) rural infrastructure development plan including construction of domestic water supply system, sewage facilities, village roads, post-harvest and storage facilities,

(vi) environmental conservation plan including soil conservation, wind protection forest, conservation of wild life, mitigation of water pollution and betterment of environment in the Study Area,

(vii) estimate of project implementation cost,

(viii) project evaluation from technical and economical viewpoints and selection of priority project, and

(ix) preparation of overall development program.

(c) Preparation of Master Plan Report (Interim Report) which will describe the study results and recommended development plan of the project.

Phase-II: Preparation of topographic map on a scale of 1/5,000 with a contour interval of 0.5 m for the mapping area of 15,000 hectares by means of photogrammetry and ground survey.

Phase-III: Feasibility Study

Field Work – III

(a) Supplemental data collection, if any.

(b) Field survey and basic study including:

(i) soil and land use survey using the aerial photo and topographic map,

(ii) topographic survey along main and secondary irrigation canals and drains to be rehabilitated and newly constructed,

(iii) construction material survey for embankment materials, sand and gravel,

(iv) agricultural and agro-economic survey for the following items:

- farming practices, cropping pattern and crop varieties,
- crop production and animal husbandry,
- incremental effect on yields of crops by improvement of irrigation and drainage system,
- labor balance on farming practices,
- profitability and marketability of crops,
- post harvest, agro-processing, storing and transportation, and
- institutional constraints to the project development,

(v) survey on agricultural support system for the following items:

- agricultural support system to introduce new crops and irrigation methods,
- research station, extension and credit,
- government policy for agricultural development in the Astana urban area,
- present activities and financial situation of organizations and institutions for agricultural support system, and
- constraints to the agricultural development in the Astana urban area,

(vi) survey on rural infrastructure particularly for domestic water supply system, sewage facilities and village roads,

(vii) cost survey for construction materials, construction equipment and laborers, if required, and

(viii) preparation of Progress Report (II), which will describe the experts' activities, the results of field survey and basic consideration for the future study for the formulation of the feasibility study.

Home Work – III

(a) Formulation of development plan consisting of:

(i) agricultural development plan including recommendable crops and cropping pattern, marketability of agricultural products in and around the Astana urban area, improved cultural practices, improved farm management system, expected farm income after implementation of the project, and improved marketing system, agricultural support system and farmers' organizations,

(ii) irrigation and drainage development plan including the calculation of water requirements and drainage module, preliminary design for rehabilitation and improvement of existing irrigation and drainage systems and water-saving irrigation system, and preparation of water management and O&M manual,

(iii) rural infrastructure development plan including domestic water supply system, sewage facilities, village roads, post-harvest and storage facilities in the selected village,

(iv) preparation of project implementation program,

(v) estimate of project cost including investment cost and O&M cost, and

(vi) project evaluation from economical, financial and socio-economical viewpoints.

(b) Preparation of Feasibility Report which will describe the study results and recommended development plan and justification of the project.

5.3 Transfer of Technology

Throughout the course of the Study, transfer of technology and training will be provided to counterpart experts by foreign experts in the following fields:

(a) Field survey and study to be conducted foreign experts assigned.

(b) Plan and design for irrigation and drainage system, on-farm development and rural infrastructure.

The above transfer of technology will be carried out in the form of on-the-job training and seminar during the course of the Study. In addition to the above transfer of technology, overseas training will also be programmed preferably in Japan.

5.4 Schedule of Study

The period required for the Study is estimated at 21 months in total for three phases, of which respective periods are as follows (Figure - 1):

Phase-I Study:	6 months
Phase-II Study:	6 months
Phase-III Study:	9 months

For the Study, the following experts will be required:

Team Leader
Irrigation/Drainage Planning Engineer
Agronomist
Agro-economist
Institutional Expert
Hydrologist
Pedologist
Hydrogeologist
Water Management Expert
Soil Mechanical Engineer
Design/Cost Estimate Engineer
Environmentalist
Aerial Photo and Topographic Survey Expert

The required manpower input is estimated at 90 man-months in total.

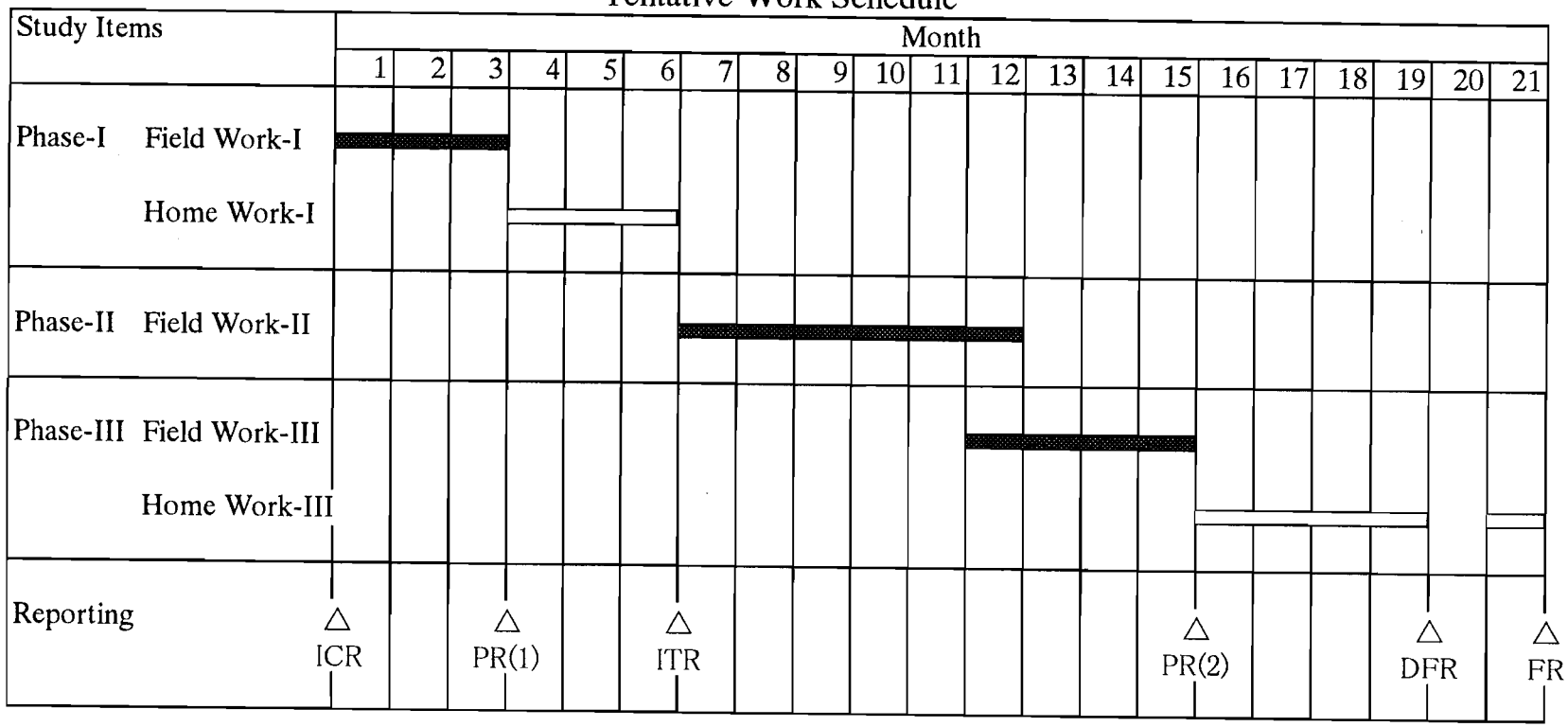
5.5 Expected Major Outputs of the Study

The major outputs of the Study are expected to be: (1) formulation of master plan for the total study area with the recommendation for the priority order of the developments, and (ii) project evaluation from the technical and economical viewpoints and implementation program for the project. These study results will be compiled in the following reports which will be submitted to the Government of Kazakstan:

Inception Report	:	immediately after start of the Phase-I Study
Progress Report (1)	:	at the end of the Field Work-I.
Interim Report	:	at the end of the Home Work-I.

Progress Report (2)	:	at the end of Field Work-III.
Draft Final Report	:	four months after start of Home Work-III
Final Report	:	within one month after getting comments from the Ministry of Agriculture on the Draft Final report.

Tentative Work Schedule



Note:
- Work in Kazakstan
- Work in Japan

ICR : Inception Report
PR(1) : Progress Report (1)
ITR : Interim Report
RR(2) : Progress Report (2)
DFR : Draft Final Report
FR : Final Report

Figure – 1

Application for the Technical Cooperation (Development Study) by the Government of Japan

1. Project Digest

1.1 Project Title

Koksaray Dam Project

1.2 Location

Syrdarya River Basin in South Kazakstan and Kzyl-Orda Oblasts (See Attachment - 1: Location Map)

1.3 Implementing Agency

(a) Name of Agency

Ministry of Agriculture, Republic of Kazakstan

(b) Organization of Agency

(See Attachment - 2: Organization Chart of Ministry of Agriculture)

1.4 Desirable Implementation Schedule

(a) Feasibility Study: Approximately 20 months from mid 2000
(b) Implementation: Approximately 5 years from 2003

1.5 Prospective Funding Sources

(a) Feasibility Study (grant): Japan International Cooperation Agency (JICA)

(b) Implementation (loan): Overseas Economic Cooperation Fund, Japan (OECF)

2. Project Justification

2.1 Sectoral Background

Kazakstan, with a population of about 17.1 million in 1993, has 223 million ha of agricultural lands, of which 35 million ha are cultivated lands and 183 million ha are grazing lands. Out of the total cultivated land, about 2.3 million ha are "regular" irrigation lands which are equipped with irrigation and drainage systems with a perennial water sources, and 0.9

million ha are "flood" irrigation lands with the irrigation system fed by the spring runoff. Most of these irrigated lands (about 70%) are concentrated in the five southern Oblasts including South Kazakstan and Kzyl-Orda Oblasts located in the Syrdarya river basin. The irrigated land produces mainly paddy, cotton, sugar beet, maize, vegetables and fodder crops.

It is estimated that 2.1 million ha of the irrigation land was cropped in 1985, 2.0 million ha in 1990 and 1.9 million ha in 1993, which shows that the cropped area even in the lands with the irrigation system is decreasing year by year. This is mainly due to: (i) improper water distribution because of deterioration of irrigation system and insufficient water management, (ii) increase of salinized and water-logged area due to lack of drainage system, and (iii) improper cultural practice and shortage of agricultural machinery.

Kazakstan has received about 13.2 km^3 of water per year on the Syrdarya river, out of which 38% have been provided in winter and 62 % in summer. The Syrdarya river flows have ensured for Kazakstan to maintain water supply for irrigated agricultural area of 300,000 to 320,000 ha with a reliability of 80-85%. In general the agricultural system of the Syrdarya river basin between Chardara reservoir and Aral Sea consumed about 90% of its annual demand in the period of April and October. During the past five year, however, the water release from Kyrgystan to the Chardara reservoir was changed to 50% and 50% in winter and summer seasons, of which the winter flow increased to 63.5% with the inflow from lateral tributaries.

The increase in winter season flow is released to Arnasai depression in Kyrgyzstan and spills over from river banks, which results in loss of water and accelerate deterioration of environmental conditions in flood plain. Meanwhile, the decreased flow in summer season causes the deficit in irrigation water and then the decrease in irrigation area , and further results in degradation of Aral Sea Improvement of water management and adequate control of water distribution throughout a year in the oblasts are, therefore, important from the view point of not only agricultural development but also conservation of environment.

2.2. Sectoral Development Policy

For the agricultural development in Kazakstan, improvement of existing irrigation and drainage system is of paramount importance. The Government, through the Ministry of Agriculture, drafted a nationwide integrated programme for the development of land amelioration and reclamation in 1991. This programme identified 775,000 ha of irrigated lands for rehabilitation and amelioration. To review this programme and to prepare a Ten years Indicative Plan for rehabilitation and amelioration, the Government requested to World Bank for its technical cooperation.

In this indicative plan, the rehabilitation and amelioration of the irrigated lands in the Syrdarya river basin were given a high priority, and the Government requested a feasibility study for the Kzyl Orda Irrigation/Drainage and Water Management Improvement Project under Technical Cooperation Program of Government of Japan. The study has been completed in March 1998 under the said program. As the succeeding project to the above, the Government of Kazakstan intends to take up the overall water management plan of the Syrdaraya river flow and Koksaray dam project in South Kazakstan and Kzyl-Orda Oblasts.

2.3. Problems to be Solved in the Sector

The irrigated area in South Kazakstan and Kzyl-Orda Oblasts has specific problems to be solved through rehabilitation and improvement. Major problems are:

(i) improper water ditribution and excessive consumption of water for crop production,

(ii) improper irrigation and drainage systems,

(iii) improper on-farm facilities including irrigation and drainage system,

(iv) increase of salinized agricultural lands,

(v) decrease of cropped area and crop yield, and

(vi) degradation of environment in the lower basin.

2.4 Outline of the Project

(1) Objectives of the Project

The development programme of the Koksaray Dam Project has following objectives:

(a) Short-term objectives

(i) to increase irrigation area through improvement of efficiency of water distribution,

(ii) to improve environmental conditions in Syrdarya river flood plain such as water logging, groundwater rise,

(iii) to mitigate the environmental degradation in and around Aral Sea,

(iv) to enhance productivity of major crops.

(b) Long-term objectives

(i) to attain high and stable production of major crops to meet the domestic demands.

(ii) to maintain a balance between agricultural development and the environment, for which the main issue would be improvement of environmental conditions in the lower basin of the Syrdarya river and in Aral Sea.

(2) Project Components

In order to attain the above objectives, the following works need to be implemented in

350,000 ha under the Project:

(i) construction of Koksaray dam

(ii) establishment of effective water management and O&M system of existing irrigation systems including the reservoirs,.

(iii) introduction of improved farming practices, including diversified cropping system, modernized agricultural practices, selection of adequate cropping season, selection of suitable crops and improvement of post harvest and marketing system, and

(iv) improvement of agricultural supporting system, including agriculture extension service, agricultural credit and marketing.

(3) Prospective Beneficiaries

About 25,300 farms households with a total population of 152,000 persons are included in the irrigated area in the Syrdarya river basin. They will be primary beneficiaries of the Project. Further, there are numbers of indirect beneficiaries in processing, marketing and other activities of inputs and outputs of the products in the Oblasts.

(4) Project Priority in National Development Plan

For the agricultural development in Kazakstan, the Government gives the first priority to the rehabilitation and improvement of existing irrigation and drainage system located in the southern part of the country. Ameriolation of irrigation and drainage systems and soil in the irrigated area in the South Kazakstan and Kzyl-Orda Oblasts has been taken up as a programme for the Ten Years Indicative Plan formulated by the World Bank and endorsed by Ministry of Agriculture.

2.5 Other related Project

The World Bank, after preparing a Ten Years Indicative Plan, will proceed to work out a plan for implementation of project to be included in a minimum five-year programme. It is expected that the World Bank will extend financial cooperation for implementation of such priority programme (tentatively envisaged to be around US$ 80 million).

3. Terms of Reference of the Proposed Study

(Refer to Attachment - 3)

4. Facilities and Information for Study Team

(1) Assignment of Counterpart Personnel of the Implementing Agency for the Study

The implementing agency of MOA has a capacity to assign counterpart personnel

corresponding to the number of Study Team members to be organized by the Government of Japan

(2) Available Data, Information, Documents, Maps, etc. Related to the Study

- Meteo-hydrological data
- Topo maps on a scale of 1:25,000, 1 : 50,000 and 1 : 100,000
- Soil maps on a scale of 1 : 100,000
- Preliminary study reports
- All information available at the offices relevant to the Project

(3) Information on the Security Conditions in the Study Area

There is no security problem in the study area in the South Kazakstan and Kzyl-Orda Oblasts, as well as in the capital city of Almaty.

5. Global Issues

(1) Environmental Components

The proposed Study involves environmental component of great significance. The improvement of water management and construction of Koksaray Dam will mitigate the environmental deterioration in the flood plain of the Syrdarya river caused by spilling-over of winter season flow, as well as in Aral Sea by less water flow in summer season which draws a worldwide attention for its environmental deterioration due to decrease in water inflow.

(2) Anticipated Environmental Impacts

The improvement of present irrigation practices will certainly have favourable impact in the environment of the downstream areas in the lower Syrdarya river, as well as in the environment of the Aral sea. These favourable impacts will also be assessed through the proposed Study.

(3) Women as Main Beneficiaries or Not

Women are participating in farming activities to an considerable extent, but not the main beneficiaries of the Project.

(4) Project Components Which Require Special Considerations for Women

The extent of women's participation in agricultural production activities should be clarified in the Study.

(5) Anticipated Impacts on Women Caused by the Project

The farming efficiency would be raised, because modernized farming practices are planned to be introduced to the area under the Project. Accordingly the women's participation

in the farming activities would be reduced after completion of the Project.

(6) Poverty Reduction Components of the Project

Farmers' economy would be improved due to increase of agricultural production.

(7) Any Constraints against the Low Income People Caused by the Project

None.

6. Undertaking of the Government of Kazakstan

In order to facilitate a smooth and efficient conduct of the Study, the Government of Kazakstan shall take necessary measures mentioned below:

(a) To secure the safety of the Study Team.

(b) To permit the members of the Study Team to enter, leave and sojourn in the country in connection with their assignment therein, and exempt them from alien registration requirement and consular fees.

(c) To exempt the Study Team from taxes, duties and any other charges on equipment, machinery and other materials brought into and out of the country for the conduct of the Study.

(d) To exempt the Study Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Study Team for their services in connection with the implementation of the Study.

(e) To provide necessary facilities to the Study Team for remittance as well as utilization of the funds introduced in the country from Japan in connection with the implementation of the Study.

(f) To secure permission or entry into private properties or restricted areas for the conduct of the Study.

(g) To secure permission for the Study Team to take all data, documents and necessary materials related to the Study out of the country to Japan.

(h) To provide medical services as needed. Its expenses will be chargeable to the member of the Study Team.

The Government of Kazakstan shall bear claims, if any arises against member(s) of the Japanese Study Team resulting from, occurring in the course of or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the member of the Study Team.

The Implementing Agency shall act as counterpart agency to the Japanese Study Team and also as coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study.

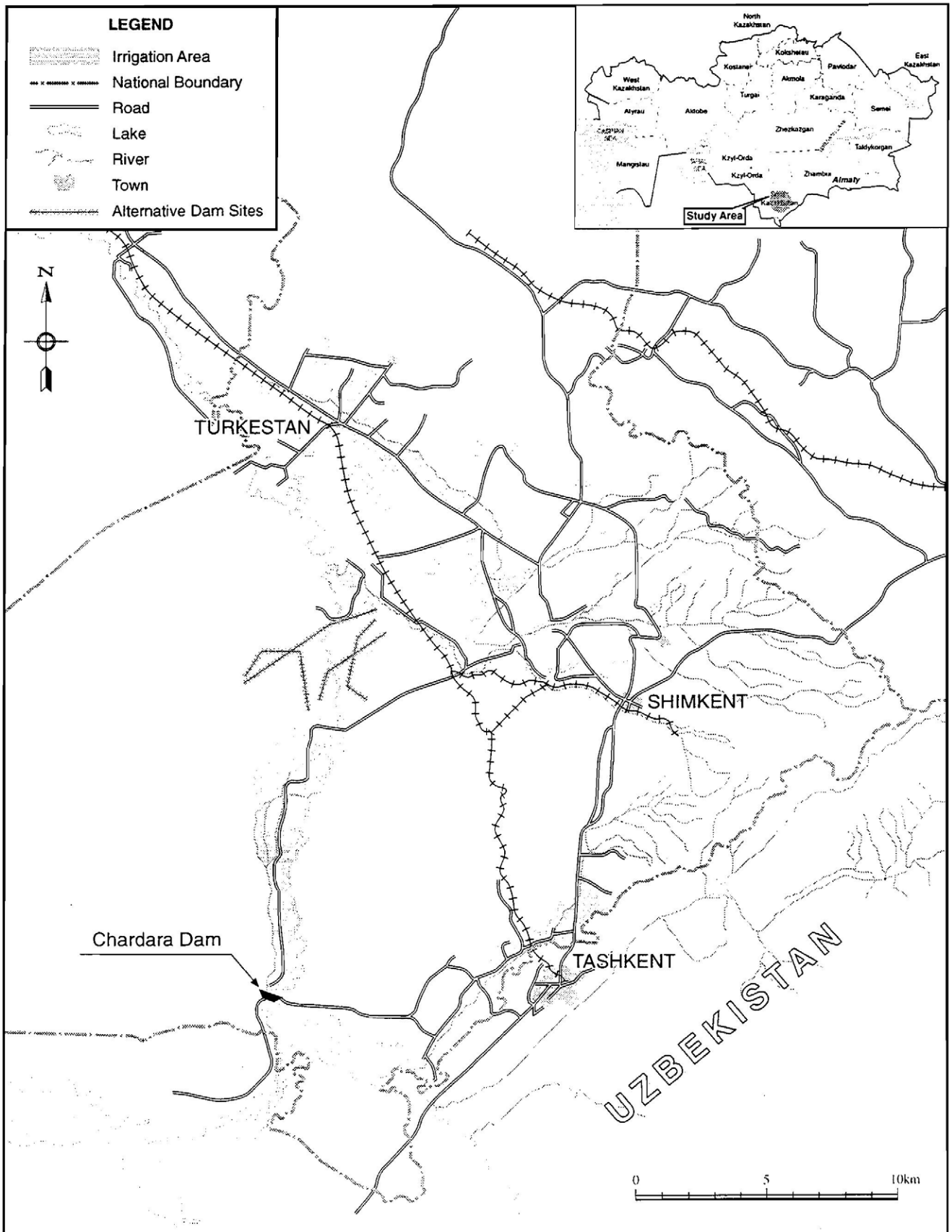
The Government of Kazakstan assured that the matters referred in this form will be ensured for a smooth conduct of the Development Study by the Japanese Study Team.

Signed:

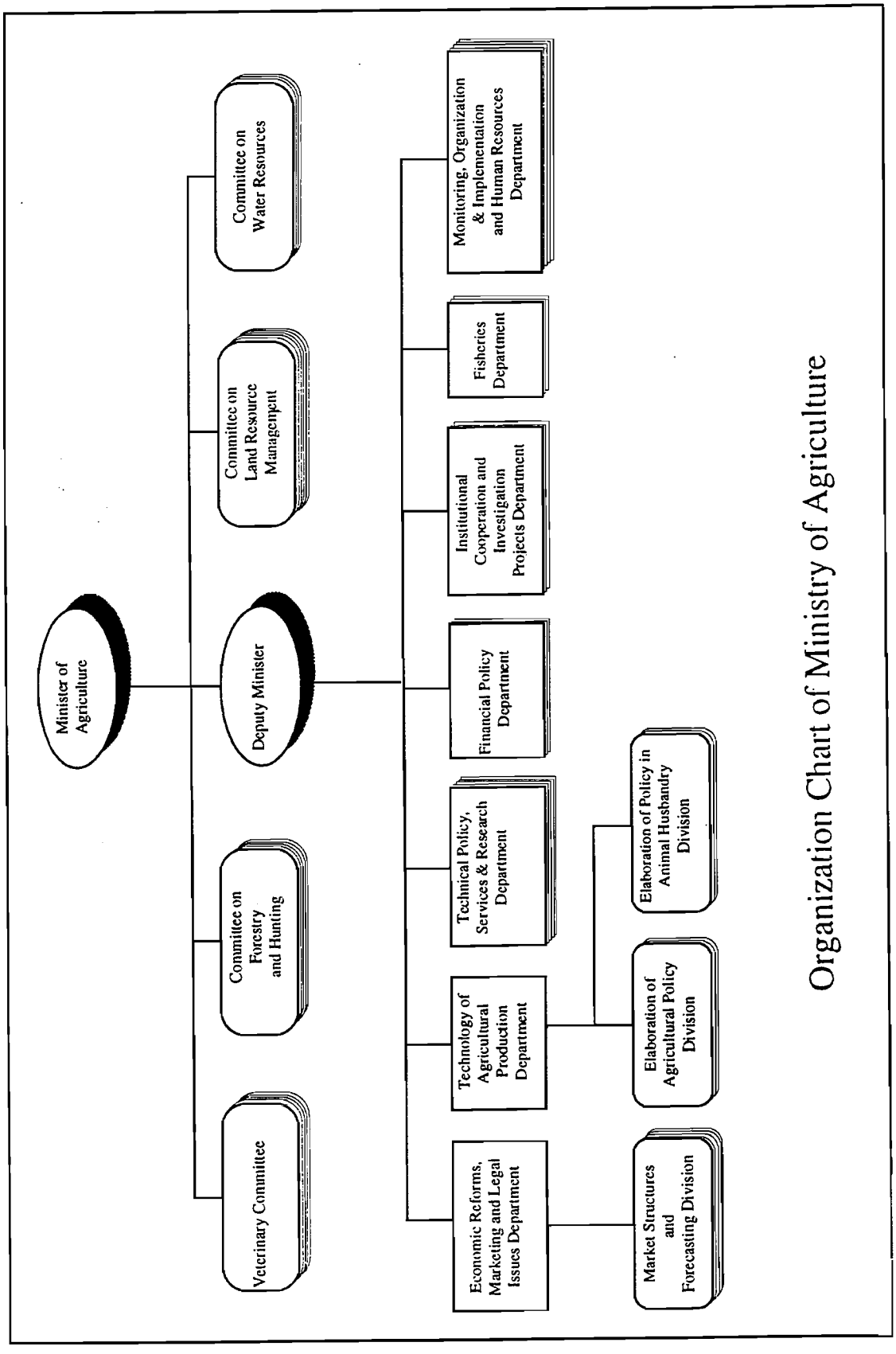
Titled:

On behalf of the Government of the Republic of Kazakstan

Date:



Location map of Study Area


Minister of Agriculture
Deputy Minister
Committee on Water Resources
Committee on Land Resource Management
Committee on Forestry and Hunting
Veterinary Committee
Monitoring, Organization & Implementation and Human Resources Department
Fisheries Department
Institutional Cooperation and Investigation Projects Department
Financial Policy Department
Technical Policy, Services & Research Department
Technology of Agricultural Production Department
Economic Reforms, Marketing and Legal Issues Department
Elaboration of Policy in Animal Husbandry Division
Elaboration of Agricultural Policy Division
Market Structures and Forecasting Division
Organization Chart of Ministry of Agriculture

Terms of Reference
for
The Feasibility Study on Koksaray Dam Project

1. Background and Justification of the Study

The Government of Kazakstan (hereinafter referred to as "GOK")has been promoting an irrigation development program particularly in the southern part of the country, where water resources of the Syrdarya river are available. In line with this, large-scale irrigation development projects of 380,000 ha have been implemented along the Syrdarya river in South Kazakstan and Kzyl-Orda Oblasts.

The Syrdarya river originates from Tien Shan ranges in Kyrgyzstan, where the river is called Naryn, then it flows down through Uzbekistan joining a right-side tributary called Chirchick and takes the name of the Syrdarya till Aral Sea. In the Naryn river in Kyrgyzstan, there exist several large reservoirs.

Since the beginning the operation of the reservoirs in the Naryn river in Kyrgyzstan was carried out following the irrigation water demands in the middle and downstream Syrdarya river basin in Kazakstan. This irrigation oriented operation of reservoirs allowed Kazakstan to supply adequate water for the above-mentioned irrigation areas and to maintain the minimum level of inundation of Syrdarya river flood plain as well as degradation of environment in and around Aral Sea.

During the past five years, however, a large amount of water was released in winter season to the Syrdarya river in Kazakstan due to the change to hydro power priority in reservoir operation in Kyrgyzstan. The Chardara reservoir located in the upstream of Syrdarya river in Kazakstan side is not able to store the increased winter season flow due to its limited storage capacity. The excess inflow into Chardara reservoir has to be released to the Arnasai depression in Uzbekistan and thus is lost because of the low carrying capacity of the Syrdarya river in the middle and downstream reaches. The increased winter flow spills over the Syrdarya river banks which causes the rise of groundwater table in its flood plan including Kzyl-Orda city. While, the inflow to Chardara in summer season decreased sharply. The deficit of the summer season flow causes the decrease in irrigation areas located along the Syrdarya river and environmental degradation of delta area. To cope with the issues, overall water management and improvement in the Shardaya river basins are of urgent necessity.

Since the implementation plan covers the vast area, it is necessary to make a master plan to formulate an overall water management and improvement plan on Syrdarya River Basin in South Kazakstan and Kzyl-Orda Oblasts and the Feasibility Study on the Koksaray Dam Project, expecting an effective and practical implementation of the project.

2. Justification of Japanese Technical Cooperation

Japan is known as one of the most advanced countries in water management for not only paddy cultivation but also upland crop cultivation. If the master plan and the feasibility study are conducted under the Japanese technical cooperation, these advanced technologies will be

introduced to Kazakstan through the studies. In addition, Japanese technology in the environmental conservation is also reputable, and the interest has been shown by Japan in various occasions in cooperating in the improvement of environment in Aral Sea.

3. Objectives of the Study

The objectives of the Study consist of the following:

(1) To prepare an overall water management and improvement plan of the Syrdarya river flow considering the efficient water use for improvement of agricultural productivity and contribution to environmental conditions of the Syrdarya river flood plain and Aral Sea,

(2) To conduct Feasibility Study for the Koksaray Dam Project identified through the overall water management plan, and

(3) To carry out technology transfer to Kazakstan counterparts personnel through on-the job training in the course of the Study.

4. Study Area

The Study Area covers approximately 400,000 ha of irrigation land extending over South Kazakstan and Kzyl-Orda oblasts located on both banks of the Syrdarya river.

5. Scope of the Study

The study will be carried out in the following two stages and each stage will be further divided into two works, respectively.

(1) Phase I

1-1 To collect and analyze relevant existing data and information on the following:

a. natural resources including topography, meteorology, hydrology, geohydrology, salinity and soil,

b. socio-economic condition,

c. agriculture,

d. agro-economic condition,

e. agricultural infrastructure,

f. environment and

g. others.

1-2 To review the existing development plans and project concerning the Study Area.

1-3 To carry out field survey and investigation on the following:

a. hydrological survey including review of existing hydrological study and water balance study including the Toktogul reservoir operation plan

b. Survey on flooding conditions along the Syrdarya river,

c. Survey on groundwater conditions in and around the Kzyl-Orda city,

d. topographic and geological investigation including reconnaissance and field checking for alternative dam sites,

e. irrigation and drainage survey including survey on present irrigation and drainage networks, and operation and maintenance condition

f. water management of existing irrigation systems and existing reservoirs operation ,

g. soil and land use including reconnaissance and soil survey to confirm the available information and field check of present land use,

h. farmers organization,

i. agricultural and agro-economic survey including interview survey to farmers for collection of information on family size, income, monthly expenses, living condition, farming practices and farmers' desire and intention to agricultural development, and survey on present conditions and constraints of the agricultural supporting services

j. construction material and cost survey including the survey on availability of construction material and labor and their unit prices,

k. environmental survey including the survey on condition of groundwater rise in the flood plain along the Syrdarya river, water pollution and ecosystem in Aral Sea, soil erosion, and confirmation of endangered plant and animal species and historical and cultural assets

l. others.

1-4 To formulate an overall water management and improvement plan of the Syrdarya river flow considering the efficient water use for improvement of agricultural productivity and contribution to environmental conditions of the Syrdarya river flood plain and Aral sea, which includes the following:

a. Improvement of water management on the basis of water balance simulation between inflow to the Chardara reservoir and irrigation water demand in the Study Area with the Koksaray reservoir to be provided downstream of the existing Chardara reservoir,

b. Alternative study on the additional reservoir plans, for which a dam site will be located between Chardara dam and confluence with the Ayrs river, one of the tributaries of the Syrdarya river,

c. management and maintenance,

d. preliminary cost estimate and

e. preparation of implementation plan

1-5 To prepare overall environmental conservation plan and conduct Initial Environmental Evaluation (IEE), if necessary

1-6 To prepare overall water management and improvement plan and the Koksaray Dam Project for the Feasibility Study in the Phase II.

(2) Phase II

2-1 To prepare topographic map covering the selected dam site and reservoir area,

2-2 To conduct the soil mechanical and geological investigations for construction of the selected dam,

2-3 To implement the Feasibility Study for selected priority project (s), which includes the following:

a. collection of data and information through additional field survey,

b. formulation of detailed water management and allocation plan of Syrdarya river flow,

c. preparation of environmental conservation plan and conduct Environmental Impact Analysis (EIA), if necessary,

d. preparation of preliminary design of dam and related facilities,

e. formulation of operation and maintenance plan,

f. preparation of implementation schedule,

g. cost estimate,

h. economic and financial analysis of project(s),

i. overall evaluation and

j. recommendation.

6. Study Schedule

The Study will be carried out in accordance with the attached tentative schedule. (see ANNEX)

7. Reports

JICA shall prepare and submit the following reports in English to GOK. Timing of submission for each report might be changed according to the Study Schedule.

(1) Inception Report

Thirty (30) copies at the commencement of the study.

(2) Progress Report (1)
Thirty (30) copies at the end of the Phase I field study in Kazakstan.

(3) Interim Report
Thirty (30) copies at the commencement of the Phase II field study in Kazakstan.

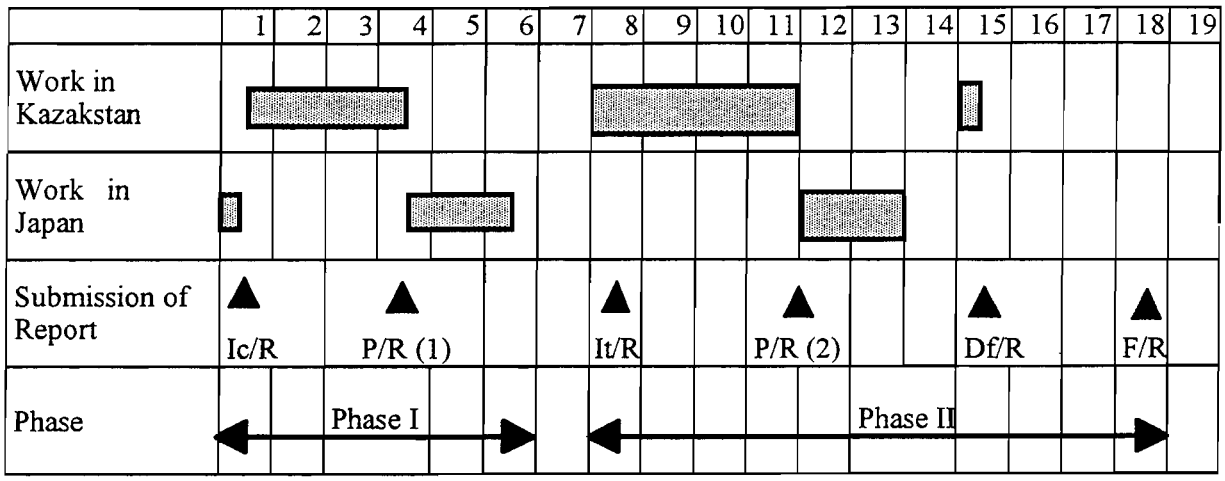
(4) Progress Report (2)
Thirty (30) copies at the end of the Phase II field study in Kazakstan.

(5) Draft Final Report
Thirty (30) copies after the Phase II home office work. GOK will provide JICA with its comments on the Draft Final Report within one (1) month after receipt of the Draft Final Report.

(6) Final Report
Sixty (60) copies within two (2) months after receipt of the GOK comments on the Draft Final Report.

ANNEX

TENTATIVE SCHEDULE



(Remarks)

Ic/R	:	Inception Report
P/R (1)	:	Progress Report (1)
It/R	:	Interim Report
P/R (2)	:	Progress Report (2)
Df/R	:	Draft Final Report
F/R	:	Final Report

Application for the Technical Cooperation (Development Study) by the Government of Japan

1. Project Digest

1.1 Project Title

Integrated Agricultural Development Project in Fergana Province

1.2 Location

Whole area of Fergana Province, of which location map is shown in **Attachment - 1**.

1.3 Implementing Agency

Ministry of Agriculture and Water Resources of the Republic of Uzbekistan

1.4 Desirable Implementation Schedule

(a) Master Plan Study : Approximately 10 months from the middle of 2000

(b) Implementation : Approximately two (2) years from 2001

1.5 Prospective Funding Sources

(a) Master Plan Study (grant): Japan International Cooperation Agency (JICA)

(b) Implementation (grant) : Japan International Cooperation Agency (JICA)

2. Background and Justification of the Project

2.1 General

Uzbekistan is a land-locked country bordering Kazakstan in the north and the west, Turkmenistan and Afganistan in the south, and bounded by Kyrgyzstan and Tadzhikistan in the east. The country occupies an area of 447,000 km^2, of which about 60% is occupied by desert and steppe, and extends 1,430 km east to west and 930 km north to south.

According to the estimate of World Bank, the population of Uzubekistan in 1995 was 22.63 million, of which about 60% lived in rural areas. The population density was 51 persons/km^2 in 1995. The population growth rate between 1985 and 1995 was 2.6%. The population of Uzbekistan is comprised of four major nationalities or ethnic groups. The largest is Uzbek which presently accounts for 74.5% of the population, followed by Russian (6.9%), Tadzhik (4.1%), Kazak (4.1%) and others.

Since early 1995, a comprehensive program of reforms has been underway in Uzbekistan and remarkable progress has been made in the transition towards a market economy. In this period, real GDP decline has remained relatively modest and social and political stability had been maintained.

The following table shows the economic indicators of Uzbekistan:

Item	1990	1991	1992	1993	1994
GDP at current prices (Rb.M)	32,340	61,459	447,200	4,428,100*	80,000*
Real GDP growth (%)	1.6	-0.5	-9.6	-2.0	-2.6
Consumer price inflation (%)	3.1	82.0	528.0	1,312.0	820*
Exports (Rb.M)	9,801	19,535	150,518	706	943
Imports (Rb.M)	14,662	21,475	191,885	947	1,121
Trade balance (Rb.M)	-4,861	-1,940	-41,367	-241	738

* : Som million

2.2 Agricultural Sector

Uzbekistan' s economy largely depends on agriculture with main crop of cotton. In 1993, agriculture accounted for 25.4% of GDP, down from 34.8% in 1992, industry for 29.6% (26.3% in 1992) and construction for 10.4% (unchanged from 1992). In addition, about 42% of population are engaged in agricultural sector.

Cotton derives 40% of export earning under the direct control of the Government. As a result, cultivation of wheat and other cereal crops, which compete with cotton, has been stagnated seriously, and Uzbekistan has to import the food grains from Russia and other CIS countries. Under this situation, the Government is paying effort to attain self sufficiency of foodstuff by converting the cotton fields to grain fields, without reducing the production of

cotton. For this, the Government intends to increase the yield of cotton through improvement of irrigation and farming practices.

The cereal crops cultivated in Uzbekistan are winter wheat, winter barley, paddy and maize. Of these crops, paddy and maize are main crops and account for about 45% and 24% of total production of crops. The total production of the cereals peaked; 3.3 million tons, and had reduced to 2.0 - 2.5 million tons in the period from 1991 to 1994 due to deterioration of irrigation and drainage facilities caused by shortage of budget for O&M and lowering of farm productivity caused by inferior farm mangement. The production has again increased in 1995 and reached 3.2 million tons due to increase of the cultivation area of cereal crops.

The following table shows the crop and dairy products in the years from 1991 to 1995.

(Unit: '000 tons)

Products	1991	1992	1993	1994	1995
Cotton	4,646	4,128	4,234	3,938	4,200
Potato	351	365	472	562	500
Vegetables	3,348	3,492	3,039	2,918	3,000
Cereals	1,908	2,257	2,142	2,467	3,200
Meet	492	469	517	509	519
Dairy	3,331	3,679	3,764	3,733	3,686

2.3 Problems To Be Solved in Agricultural Sector

Uzbekistan is blessed with high water potentials and fertile lands, which are the fundamental resources for profitable agricultural development. In spite of these advantages, the agricultural profitability of the country remains low level. For the profitable and sustainable agricultural development in Uzbekistan, the following countermeasures will be needed:

(a) Shift of present monoculture system of cotton to the diversified cropping system.

(b) Increase of foodstuff production.

(c) Establishment of environmentally sustainable agriculture system.

(d) Improvement of irrigation and drainage systems and water management technology.

(e) Improvement of agro-processing and marketing.

(f) Promotion of rural development and enhancement of farmers' living conditions.

2.4 Outline of the Project

(1) Objectives of the Project

The main objective of the Integrated Agricultural Development Project in Fergana Province is to establish the efficient production base and post-harvest and marketing systems for agricultural products in order to enhance the farmers' living standard and to give a working opportunity to the farmers. To sustain and accelerate the objective, the project needs to address the following issues:

(a) Strengthening of the production system through efficient use of lands, improvement of farm technology and appropriate management and conservation of land and water resources through rehabilitation of irrigation system.

(b) Improvement of land productivity and living conditions in villages by lowering groundwater table through provision of sub-surface drainage system.

(c) Strengthening of post-harvest and marketing system through price stabilization, construction of post-harvest facilities, provision of rural market infrastructure, promotion of market development and organization and establishment of rule and regulation.

(d) Strengthening of support services and facilities by ensuring credit accessibility and savings mobilization in the rural areas, improving extension, information and other support services, promoting social industries, minimizing agricultural risks and strengthening farmers' organization.

(2) Project Components

The project will consist of the following components:

(a) Improvement of drainage conditions in farm lands and village areas particularly in Altiarik, Rishton and Bagdad Districts (Rayons) in Fergana Province by lowering groundwater table through provision of sub-surface drainage system.

(b) Rehabilitation and improvement of irrigation system including canal lining, rehabilitation of canal structures and on-farm development.

(c) Improvement of rural infrastructure including village roads, drinking water supply and power distribution system.

(d) Establishment of post-harvesting and marketing system.

(e) Introduction of improved farming practices, including the selection of profitable crops and diversified cropping system, proper and timely application of fertilizers and chemicals, etc.

(f) Improvement of agricultural support services such as agricultural research, agricultural credit and agricultural extension system.

(g) Establishment of agricultural cooperatives which will have the functions of marketing agricultural products, procurement of farm inputs and rental of agricultural machinery to farmers.

(h) Establishment of effective water management and O&M system.

(i) Monitoring and evaluation of irrigation, agricultural and environmental aspects.

3. Terms of Reference of the Proposed Study

The terms of reference for master plan is presented in **Attachment - 2**.

4. Facilities and Information for the Study Team

(1) Assignment of Counterpart Personnel of the Executing Agency for the Study

Ministry of Agriculture and Water Resources of Uzbekistan will assign counterpart personnel to meet the requirement of the Study Team.

(2) Available data, Information, Documents, Maps etc. Related to the Study

- Meteo-hydrological data,
- Topographic maps on a scale of 1:50,000 and 1:100,000,
- Soil and geological maps on a scale of 1:50,000 and 1:250,000,
- Hydrogeological data,
- Agricultural statistics,
- Production year book,
- Previous study reports, and
- All information available at the offices relevant to the project.

(3) Information on the Security Conditions in the Study Area

There is no security problem in the Study Area.

5. Global Issues

(1) Environmental Issue

The environmental impact assessment should be done within a framework of the Study in order to formulate a plan with the minimum adverse effects on natural and social

environment and mitigation measures. The implementation of this project can save irrigation water and would result in increase of inflow to Aral Sea.

(2) Women in Development

Women constitute overwhelming majority of farmers in Uzbekistan. The Government makes a deliberate effort to ensure the place of women in the main stream of development. Therefore, the Study will verify the need for more involvement of women and the constraints they face. The proposed plan should be formulated with a particular attention to women in development.

(3) Poverty Reduction Components of the Project

Farmers' economy would be largely improved due to increase of agricultural production and their working opportunity will be increased by establishment of post-harvesting and marketing system after implementation of the project.

(4) Any Constraints against the Low Income People Caused by the Project

None.

6. Undertakings of the Government of Uzbekistan

In order to facilitate smooth and efficient execution of the Study, the Government of Uzbekistan shall undertake to:

(a) Secure the safety of the Study Team.

(b) Permit the members of the Study Team to enter, leave and sojourn in the country in connection with their assignment therein, and exempt them from alien registration requirement and consular fees.

(c) Exempt the Study Team from taxes, duties and any other charges on equipment, machinery and other materials brought into and out of the country for conducting the Study.

(d) Exempt the Study Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Study Team for their services in connection with implementation of the Study.

(e) Provide necessary facilities to the Study Team for remittance as well as utilization of funds introduced into the country from Japan in connection with implementation of the Study.

(f) Secure permission or entry into private properties or restricted areas for the conduct of the Study.

(g) Secure permission for the Study Team to take all data, documents and necessary materials relating to the Study out of the country to Japan.

(h) Provide medical services as needed. Its expenses will be chargeable to the member of the Study Team.

The Government of Uzbekistan shall bear claims, if any arises against member (s) of the Study Team resulting from, occurring in the course of or otherwise connected to the discharge of their duties in implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the member(s) of the Study Team.

Ministry of Agriculture and Water Resources shall act as counterpart agency to the Study Team and also as coordinating body in relation with other governmental and non-governmental organizations concerned for smooth implementation of the Study.

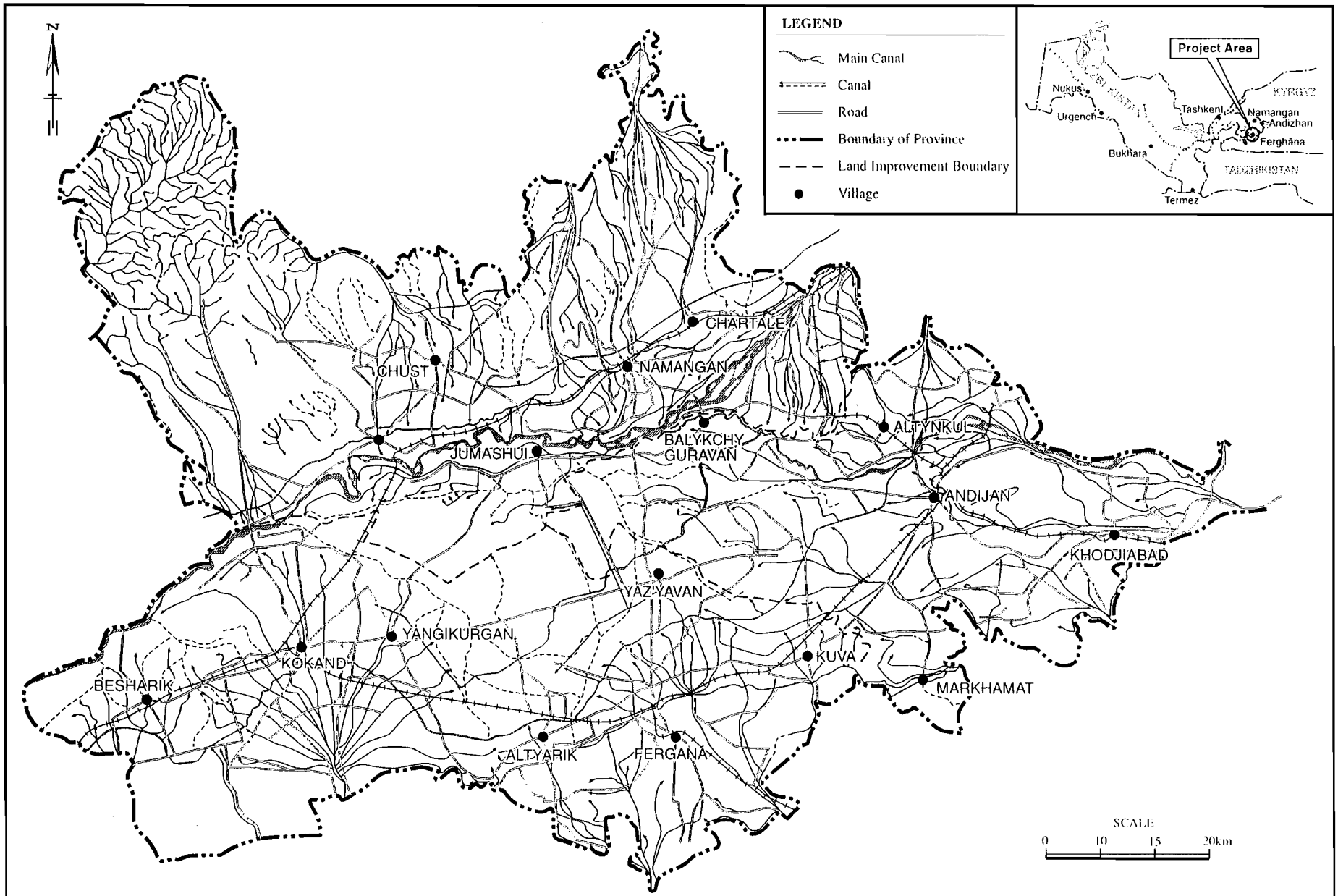
The Government of Uzbekistan assured that the matters referred in this form will enable smooth execution of the Development Study by the Study Team.

Signed:

Titled:

On behalf of the Government of the Republic of Uzbekistan

Date:



Location Map of Study Area

Attachment - 2

Terms of Reference
for
Master Plan Study
on
Integrated Agricultural Development Project
in
Fergana Province

1. Background and Justification of the Study

More than 25% of Uzbekistan's GDP is generated in agriculture, which employs about 42% of its labor force. Primary commodity of cotton fiber accounts for 40% of merchandise export. As a result, cultivation of wheat and cereal crops, which compete with cotton, has been stagnated seriously , and Uzbekistan has to import the food grains from Russia and other CIS countries. Under this situation, the Government is paying effort to attain self sufficiency of foodstuff by converting the cotton fields to grain fields without reducing the production of cotton. For this, the Government intends to increase the yield of cotton through improvement of irrigation and farming practices.

In Uzbekistan, irrigation is the most useful means for reducing vulnerability of production. Uzbekistan has 4 million ha of cultivated land, or about 9% of the country's land area, of which about 93% is irrigated. Surface irrigation is the most common method of irrigation, though some irrigation systems have been upgraded to sprinkler system. Since 1991, insufficient funding of O&M resulted in a severe deterioration of irrigation and drainage facilities, which results in increase of salined areas by about 10% in the irrigated land.

The Fergana Province with a population of 2.74 million is located in the Fergana Valley; easternmost part of the country as shown in Attachment-1. Its total area is 481,000 ha, of which 286,800 ha is irrigated farm land. Since this province is most highly populated area in the country, the farm land area per capita is only 0.10 ha. The main crops cultivated in the area are as shown in the following table:

(Unit: ha)

Crops	Cultivated Area
Cotton	127,000
Wheat	92,000
Orchard	34,400
Lucerne	16,200
Maize	11,600
Vegetables	5,600
Others*	73,200
Total	360,000

(Note) *:These lands are not used at present because of salined lands.

As mentioned in the above table, about 73,200 ha or 20% of total irrigation area is not used at present, because of high salinity caused by high groundwater table. This salinization problem is very serious particularly in three districts; Altiarik, Rishton and Bagdad. The saline area occupies about 33% of total irrigated land in Altiarik District, 40% in Rishton and 40% in Bagdad.

The Irrigation water sources are tributaries of the Syrdarya River, and water is carried to farm lands through 6 main canals with a total length of 680 km and more than 5,000 km of subordinate canals, most of which need rehabilitation and improvement. The length of existing irrigation and drainage canals in Fergana Province is as tabulated below:

(Unit: km)

Canal/Drain	Length
Main canals (6 Nos.)	680
Inter-farm canals	3,055
On-farm canals	2,031
Inter-farm collectors	3,862
On-farm collectors	9,079
Well for vertical drain (Nos.)	1,288

Taking the above-mentioned adverse situation seriously, and understanding that the farmers in this province are the poorest over the county due to the smallest land holding size per capita, the Government of Uzbekistan intends to request the Government of Japan for technical assistance to prepare the agricultural master plan dealing with the whole territory of Fergana Province and to specify the priority project to be requested for the Grant Aid of the Japanese Government for its implementation.

2. Justification of Japanese Technical Cooperation

Japan is known as one of the most advanced countries in the integrated agricultural development particularly for the small holding farms including the development of irrigated agriculture, agricultural supporting system, farmers' organizations, and post-harvest and marketing system of agricultural products. If the master plan study is conducted under the Japanese technical cooperation, these advanced technologies will be introduced to Uzbekistan through the Study.

3. Objective of the Study

The objectives of the Study are to formulate a strategic and comprehensive master plan for integrated agricultural development in the Fergana Province and to specify the development program to be requested for the Grant Aid of the Japanese Government for its implementation.

4. Study Area

The master plan study will cover the whole territory of Fergana Province with a total area of 3,600 km2 located in Fergana Valley.

5. Scope of the Study

5.1 General

The scope of the proposed master plan study (hereinafter referred to as "the Study") will be as follows:

(a) Master plan study for the whole Fergana Province.

(b) Determination of priority project to be requested for the Grant Aid of the Japanese Government for its implementation.

(c) Preparation of aerial photo for the area covering the whole area of Fergana Province of about 4,000 km^2 and topographic map for about 100 km^2 for the priority area.

The master plan study will continuously be carried out for 10 months. In the first step of the Study; four months from start of the Study, the Study Team will prepare the Interim Report which will describe the result of evaluation on development potential, project needs, development strategies, recommendation for the priority project to be requested for the Grant Aid of the Japanese Government for its implementation, and schedule for future study. After submittal of the Interim Report and approval of report by the Uzbek Government and JICA, the Study Team will continue the study for preparation of various development plans and make preliminary design and cost estimate for the priority project.

5.2 Detailed Scope of the Study

In order to formulate the master plan, the following activities will be required:

(1) First Step of Study (first to fourth month)

(a) Collection and review of existing data and information on:

(i) natural resources including topography, meteorology, hydrology, groundwater, salinity and soil,

(ii) socio-economy including population and number of households, social structure and social infrastructure, income, living standards, national and regional development plans, national and regional economy, organizational structure of regional government,

(iii) agriculture including land use, cropped area, cropping pattern, crop variety, unit yield, farming practices and land holding system,

(iv) agro-economy including price of product, price of farm inputs, marketing system and farm economy,

(v) irrigation and drainage including inventory list for existing irrigation and drainage facilities, design criteria, information on O&M and water management,

(vi) rural infrastructure including village roads, domestic water supply system, electric supply system, telecommunication system, sewage system, post-harvest and storage facilities,

(vii) farm and farmers' organizations and agricultural supporting system including farm management system, water management system, agricultural cooperative, agricultural research, agricultural credit system, extension and other supporting services, and

(viii) environment including ecosystem, soil erosion and sedimentation, water quality, and historical and cultural assets.

(b) Field survey and basic study including:

(i) hydrological survey including review of existing hydrological and water balance study for each existing irrigation system,

(ii) groundwater survey including review of existing study, confirmation of existing location of well for vertical drain, survey on present well condition and check of water table and quality,

(iii) soil and land use survey including reconnaissance and soil survey to confirm the information shown in the existing soil map and field check of present land use using the aerial photo to be shot under the Project and the topographic map,

(iv) irrigation and drainage survey including survey on present irrigation and drainage networks and on-farm facilities, operation and maintenance condition and water charge collection,

(v) socio-economic survey including review of national and regional development plans, survey on social structure of village, living standard of villagers and women's participation in social activities,

(vi) agricultural and agro-economic survey including interview survey to farmers for the collection of information on family size, income, monthly expenses, living condition, farming practices and marketing system, farmers' desire and intention to agricultural development, and survey on present conditions and constraints of the agricultural supporting services,

(vii) rural infrastructure survey including the survey on present conditions of village road, domestic water supply system, electric supply system, telecommunication system, sewage system, post-harvest and storage facilities, community center, school and health center, and interview to villagers to hear their desire and intention,

(viii) construction material survey and cost survey including the survey on availability of construction materials and labor forces and their unit prices, and

(ix) environmental survey including survey on condition of water pollution, ecosystem, soil erosion, and confirmation of endangered plant and animals species and historical and cultural assets.

(c) Preparation of aerial photo covering the whole Fergana Province.

(d) Evaluation of development potential, project needs and development strategies and clarification of present constraints for future agricultural development.

(e) Determination of priority project to be requested for the Grant Aid of the Japanese Government for its implementation.

(f) Preparation of Interim Report which will describe the result of evaluation on development potential, project needs, development strategies, recommendation for the priority project to be requested for the Grant Aid of the Japanese Government for its implementation, and schedule for future study.

(2) Second Step of Study (fifth to seventh month)

(a) Supplemental data collection,

(b) Preparation of topographic map for the priority area of around 100 km^2 using the aerial photo taken in the first step of the Study.

(c) Formulation of development plans consisting of :

(i) water resources plan including the assessment of surface water and groundwater potential and water balance study between the irrigation demand and water supply,

(ii) drainage improvement plan putting main emphasis on lowering groundwater table in agricultural lands and village areas,

(iii) agricultural development plan including recommendable crops and cropping pattern, modernized farming practices, expected farm income after implementation of the Project, and improved marketing system and agricultural support system,

(iv) irrigation development plan including rehabilitation and improvement program of existing irrigation system and establishment of effective water management and O&M system,

(v) rural infrastructure development plan including construction of domestic water supply system, electric supply system, sewage facility, road, post-harvest and storage facilities,

(vi) environmental conservation plan including soil conservation, conservation of wild life, mitigation of water pollution and betterment of environment condition in and around the Aral Sea,

(vii) estimate of project implementation cost, and

(viii) project evaluation from technical and economical viewpoints, and

(ix) preparation of overall development program.

(d) Preliminary design and cost estimate for the priority project and justification of the project for the Japanese Grant Aid,

(e) Preparation of Master Plan Report which will describe the master plan for the whole Fergana Province and implementation program for the priority project.

5.3 Transfer of Technology

Throughout the course of the Study, transfer of technology and training will be provided to counterpart experts by foreign experts in the following fields:

(a) Field survey and study to be conducted foreign experts assigned.

(b) Plan and design for irrigation and drainage system, on-farm development and rural infrastructure.

The above transfer of technology will be carried out in the form of on-the-job training and seminar during the course of the Study. In addition to the above transfer of technology, overseas training will also be programmed preferably in Japan.

5.4 Study Schedule

The period required for the Study is estimated at 10 months in total as shown in Figure – 1.

For the Study, the following experts will be required:

Team Leader
Irrigation/Drainage Planning Engineer
Agronomist
Agro-economist
Sociologist
Hydrologist
Pedologist
Hydrogeologist
Water Management Expert
Soil Mechanical Engineer
Design/Cost Estimate Engineer
Environmentalist
Aerial Photo and Topographic Survey Expert

The required manpower input is estimated at 70 man-months in total.

5.5 Expected Major Outputs of the Study

The major outputs of the Study are as follows:

Inception Report	:	at the start of the Study
Interim Report	:	four months after the start of the Study
Draft Final Report	:	eight months after the start of the Study
Final Report	:	within one month after getting comments from the Ministry of Agriculture and Water Resources

Tentative Work Schedule

Study Item		Month										
		1	2	3	4	5	6	7	8	9	10	11
First Step	Data collection											
	Field survey											
	Aerial photo shooting											
	Development study											
	Determination of priority project											
Second Step	Supplemental data collection											
	Preparation of topographic map											
	Formulation of development plans											
	Preliminary design of priority project											
Third Step	Finalization of Master Plan Report											
Reporting		△ ICR				△ ITR				△ DFR		△ FR

Note: ▬ Work in Uzbekistan
▭ Work in Japan

ICR: Inception Report
ITR: Interim Report
DFR: Draft Final Report
FR: Final Report

Figure – 1

TECHNICAL COOPERATION
BY
THE GOVERNMENT OF JAPAN

APPLICATION

by
The Government of The Republic of Turkmenistan
for
Feasibility Study
on
Establishment of Agricultural Training Center
to
The Government of Japan

1. Project Digest

1.1 Project Title

Project for Establishment of Agricultural Training Center

1.2 Location

Farm (about 500 ha) of Agricultural University of Turkmenistan, located in Guyar District of Ahal Province (15-km northeast of Ashgabat), of which location map is presented in Attachment - 1.

1.3 Implementing Agency

Agricultural University of Turkmenistan under the custody of Ministry of Agriculture and Water Resources (MAWR) of Turkmenistan, of which organization charts are attached hereto as Attachment - 2 and Attachment - 3 respectively.

1.4 Desirable Implementation Schedule

(a) Feasibility Study : Approximately 10 months from the middle of 2000

(b) Implementation : Approximately one (1) year in 2003

1.5 Prospective Funding Sources

(a) Feasibility Study (grant) : Japan International Cooperation Agency (JICA)

(b) Implementation (grant) : Japan International Cooperation Agency (JICA)

2. Background and Justification of the Project

2.1 Land and Population

Turkmenistan is a land-locked country bordering Kazakstan in the north, Uzbekistan in the northeast and east, Iran in the south, Afghanistan in the southeast and bounded by the Caspian Sea in the west. The country occupies an area of 488,100 km^2, of which about 90% is occupied by deserts, and extends 1,100 km east to west and 650 km north to south.

Turkmenistan is located in the desert climatic zone and severe continental climate is dominant due to topography. The temperature shows great variances in a day and year. It rarely drops below 35 °C in summer and rises up to 50 °C at Karakum Desert. In winter, the temperature at Kushka drops to -33 °C. The annual precipitation is scarce, below 250 mm over the country and 100 - 110 mm in some areas.

The Amudarya river is the most important water resource of the country. The Amudarya river with a catchment area of 309,000 km^2 originates at the Pamir Plateau, and flows down to Aral Sea through Afghanistan and Turkmenistan. The mean annual discharge of the river is 45 km^3 at Mukry, where the intake point of the Karakum Canal is located.

According to the estimate of World Bank, the population of Turkmenistan in 1995 was 4.6 million, most of which live along the Amudarya river and the Karakum Canal. The population density was 9.0 persons/km^2 in 1995, which is the second lowest among the republics of Former Soviet Union, following Kazakstan. The population growth rate has been 3.9% since 1989. This high growth rate is mainly attributed to the immigration from the other CIS countries. The population of Turkmenistan is comprised of three major nationalities or ethnic groups. The largest is Turkmen which presently accounts for 77.0% of the population, followed by Uzbek (9.2%) and Russians (6.7%).

2.2 National Economy

After independence, Turkmenistan took a gradual method of economic reform standing apart from the radical reform of Russia, and therefore the collapse of the Russian economic system has not much affected the Turkmen economy. In addition, since Turkmenistan is agricultural country and rich in oil and gas, the country less suffered from the economic depression compared to CIS countries.

Another noticeable point of the Turkmen economy is that the economy in Turkmenistan is much supported by the cotton production and extraction of oil and gas. In the time of the former Soviet Union, the government paid main efforts to the construction of large-scale irrigation system including the Karakum Canal mainly for cotton cultivation, development of gas and oil resources and construction of gas and oil line systems. As a result, the production of cotton and gas has largely increased, and Turkmenistan is now ranked to be the second producing country for both gas and cotton among the countries of the former Soviet Union; after Russia for gas and after Uzbekistan for cotton.

The following table shows the net material product (NMP) by sector in the years from 1992 to 1995:

(Unit: %)

Sector	1992	1993	1994	1995
Agriculture	16.3	12.2	24.2	34.9
Industry	65.1	62.4	40.7	24.8
Construction	9.0	14.3	26.2	14.7
Transportation and communication	3.9	4.6	3.0	5.6
Trade and Services	5.7	6.5	5.9	4.3
Taxes	-	-	-	5.6
Total	100	100	100	100

As mentioned above, the economy of Turkmenistan was developed forcibly depending on the cotton-related or linked to the extraction of gas in the time of the former Soviet Union. After dissolution of the former Soviet Union, however, NMP proportion of industry has decreased, while those of agriculture and construction have increased as shown in the above table. Particularly for the agriculture, diversification of crops from cotton to grains, fruits and vegetables is intended expecting the self sufficiency of food crops.

2.3 Agricultural Sector

Turkmenistans's economy remains primarily agricultural, accounting for 30% of GDP in 1995, and 43% of employment. An additional 10% of the labor force is employed in agriculture-related industries, mostly agribusiness enterprises.

The agriculture in Turkmenistan is almost entirely dependent on irrigation, which covers 1.77 million hectares in 1995. However, these lands have been developed mainly for the cotton cultivation in the Soviet time, and almost all the foodstuffs had been imported from the other CIS countries. After independence, the government is paying its effort to attainment of self sufficiency for foodstuffs through improvement of irrigation facilities and other agricultural infrastructure. As a result, it is reported that the self sufficiency of the foodstuffs will be attained in 1998.

The following table shows the crops and dairy products in the years from 1991 to 1995:

(Unit: '000 tons)

Items	1991	1992	1993	1994	1995
Cereals	517	717	975	1,106	1,294
Cotton	1,443	1,300	1,341	1,283	1,293
Potato	30	34	31	20	21
Vegetables	388	298	286	391	376
Meet	107	98	110	107	111
Milk	458	471	712	716	727
Egg (million nos.)	300	292	267	270	270

According to the above table, the production of cotton has been depressed since 1994. As for the other crops, it is noticeable that the production of cereals is increasing showing 2.1 times of production in 1995 as compared with 1991. Among the cereals, paddy production has already attained the self sufficiency. The double cropping of wheat has started in some

area to attain the self sufficiency. The production of vegetables showed a decreasing tendency from 1992, but has recovered since 1994. As for the fruits, since the government has a plan to export them, the cultivation area and production will increase in near future.

2.4 Problems To Be Solved in Agricultural Sector

For the profitable and sustainable agricultural development in Turkmenistan, the following measures should be taken:

(i) Shift of present monoculture system to the diversified cropping system.

(ii) Increase of foodstuff production.

(iii) Establishment of environmentally sustainable agriculture system.

(iv) Improvement of marketing system.

(v) Rehabilitation and improvement of irrigation and drainage facilities and other agricultural infrastructure.

(vi) Improvement of irrigation water management technology.

(vii) Promotion of rural development and enhancement of farmers' living conditions.

In addition to the above measures, a particular importance should be placed on the development of agricultural extension and training system. In Turkmenistan, the agricultural extension and training system does not exist except the direct system between farm technical staff and the MAWR official. However, since high progress of privatization in the agricultural sector and increase in number of private farms are expected in near future, the necessity for the agricultural extension and training system will rapidly increase for the private farms. In this context, the training of the government staff and farmers leaders through establishment of the agricultural training center will be of paramount importance for the profitable and sustainable agricultural development.

2.5 Outline of the Project

(1) Objective of the Project

The main objective of the Project for Establishment of Agricultural Training Center is to conduct the training to the government staff concerned and farmers leaders through establishment of the agricultural training center under the custody of Agricultural University of Turkmenistan. To sustain and accelerate the objectives, the project needs to address the following issues:

(a) Training to Government Staff

The Agricultural Training Center will organize training/seminar for the governmental staff to develop their implementation capability. The staff training/seminar will basically focus on:

(i) To orient the staff towards the objectives and process of the agricultural training to enable them to efficiently implement the works.

(ii) To build a team approach among the staff to skilfully handle their team relations.

(iii) To train in crop cultivation and animal husbandry, water use and supporting facilities, agricultural policies, research and technology, market development, supply and prices of agricultural crops and livestock and agro-industrial law.

(iv) To review the outcome of the training and suggest improvement measures to collectively promote the implementation of the works.

(b) Training to Farmers Leaders

In order to develop farmers' skill and capacity to manage the agricultural and irrigation system, the training will be organized for the farmers leaders, who will be recommended by the provincial agricultural offices. The training will be provided in the fields of:

(i) To train in agricultural practices including cultivation methods of selected crops, application methods of fertilizers and agricultural chemicals, irrigation method and operation and maintenance of irrigation facilities, and in animal husbandry.

(ii) To train in agricultural extension practices, cooperative and marketing and agricultural credits.

(iii) To provide guidance to farmers for proper farming practices in the demonstration farm planned to be attached to the Center.

(2) Project Components

The project will consist of the following components:

(a) Buildings including:

(i) Office, lecture rooms (50 persons) and library with reading room.

(ii) Laboratories for biological and agro-chemical tests and for defining qualities of crops and livestock.

(iii) Club (200 seats).

(iv) Guest houses (15 persons).

(v) Dormitories (50 persons).

(vi) Store houses for fertilizers and agro-chemicals.

(vii) Garage and repair shop.

(viii) Supply system of gas, electricity and drinking water.

(ix) Fence around the center.

(b) Demonstration farm (500 ha) including:

(i) Irrigation (sprinkler, drip and surface irrigation system) and drainage facilities including road network.

(ii) Experimental farms.

(iii) Demonstration farm.

(iv) Seed multiplication farm.

(v) Green houses for vegetables, mushroom, lemon and flowers.

(vi) Grazing yards for cattle, pig and poultry.

(vii) Rehabilitation of road from the bridge crossing over the Karakum Canal to the proposed center for about 2 km.

(c) Plant and equipment including:

(i) Pumping equipment.

(ii) Mini-plant for meat processing.

(iii) Mini-plant dairy processing.

(iv) Mini-plant for processing of poultry meat.

(v) Plant for production of mixed feed for grazing cattle, pig and poultry.

(vi) Office and O&M equipment.

3. Terms of Reference of the Proposed Study

The terms of reference for feasibility study on the project is graphically presented in Attachment - 4.

4. Facilities and Information for the JICA Study Team

(1) Assignment of Counterpart Personnel of the Executing Agency for the Study

MAWR will assign counterpart personnel from the Agricultural University to meet the requirement of the JICA Study Team.

(2) Available data, Information, Documents, Maps, etc.

(i) Meteorological and hydrological data.

(ii) Topographic maps on a scale of 1:50,000 and 1:250,000.

(iii) Soil and geological maps on a scale of 1:50,000 and 1:250,000.

(iv) Agricultural statistics.

(v) Production year book.

(vi) Previous study reports.

(vii) All information available at the offices relevant to the project.

(3) Information on the Security Conditions in the Study Area

There is no security problem in the study area as well as in the capital city of Ashgabat.

5. Global Issues

(1) Environmental Issue

The environmental issue should be dealt with within a framework of the training in order to let farmers know the importance of the environmentally sustainable agriculture development.

(2) Women in Development

Women constitute overwhelming majority of farmers in Turkmenistan. The Government makes a deliberate effort to ensure the place of women in the mainstream of development. Through the training, therefore, it is needed to verify the necessity for more involvement of women's status and the constraints they face. The proposed training program should be formulated with a particular attention to women in development.

(3) Poverty Reduction Components of the Project

Farmers' economy would be largely improved due to increase of agricultural production through implementation of the project.

(4) Any Constraints against the Low Income People Caused by the Project

None.

6. Undertakings of the Government of Turkmenistan

In order to facilitate smooth and efficient execution of the Study, the Government of Turkmenistan shall undertake to:

(a) Secure the safety of the JICA Study Team.

(b) Permit the members of the JICA Study Team to enter, leave and sojourn in the country in connection with their assignment therein, and exempt them from alien registration requirement and consular fees.

(c) Exempt the JICA Study Team from taxes, duties and any other charges on equipment, machinery and other materials brought into and out of the country for conducting the Study.

(d) Exempt the JICA Study Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the JICA Study Team for their services in connection with implementation of the Study.

(e) Provide necessary facilities to the JICA Study Team for remittance as well as utilization of funds introduced into the country from Japan in connection with implementation of the Study.

(f) Secure permission or entry into private properties or restricted areas for the conduct of the Study.

(g) Secure permission for the JICA Study Team to take all data, documents and necessary materials relating to the Study out of the country to Japan.

(h) Provide medical services as needed. Its expenses will be chargeable to the member of the JICA Study Team.

The Government of Turkmenistan shall bear claims, if any arises against member(s) of the JICA Study Team resulting from, occurring in the course of or otherwise connected to the discharge of their duties in implementation of the Study, except when such claims arise from gross negligence or wilful misconduct on the part of the member(s) of the JICA Study Team.

MAWR shall act as counterpart agency to the JICA Study Team and also as coordinating body in relation with other governmental and non-governmental organisations concerned for smooth implementation of the Study.

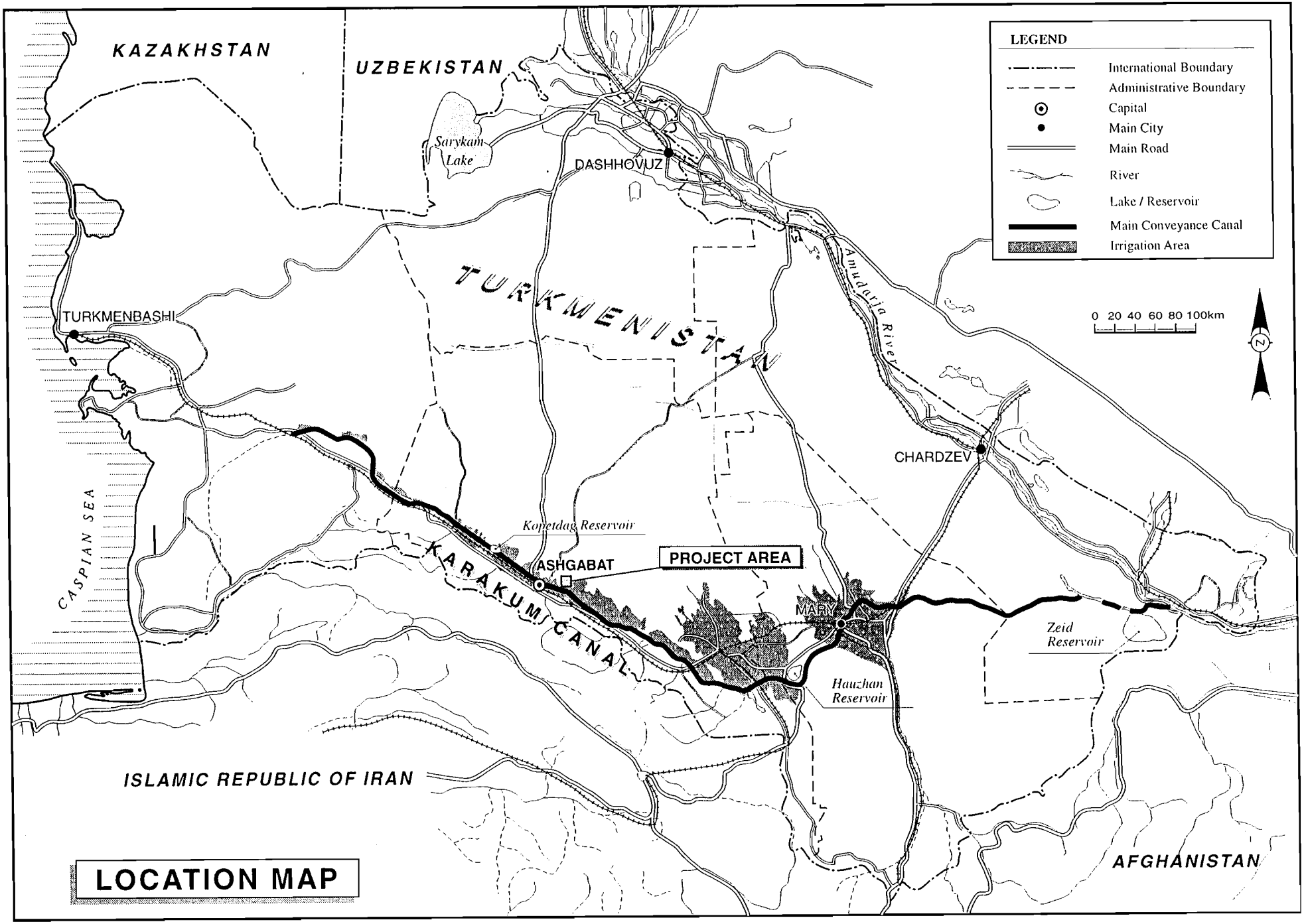
The Government of Turkmenistan assured that the matters referred in this form will enable smooth execution of the Study by the JICA Study Team.

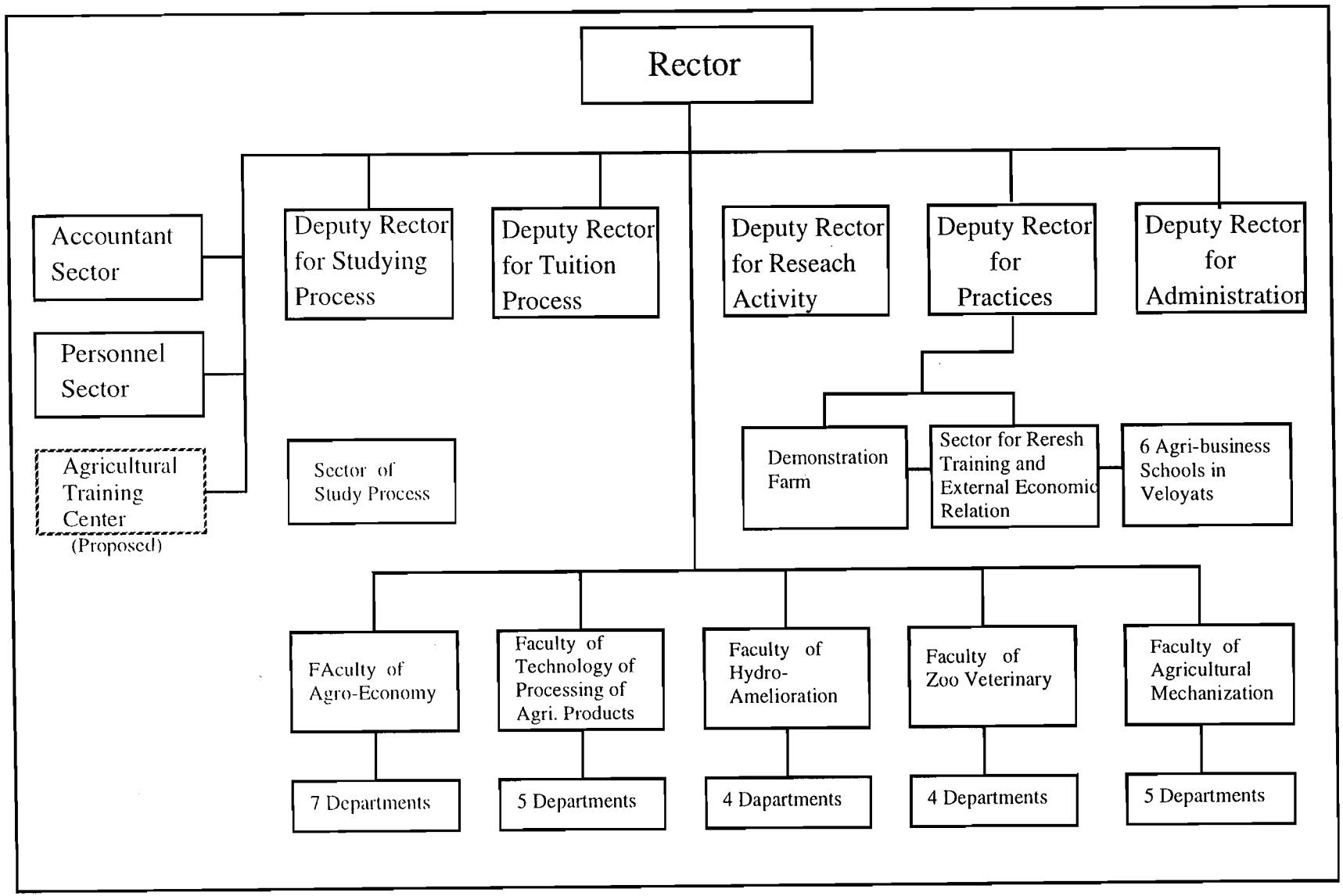
Signed:

Titled:

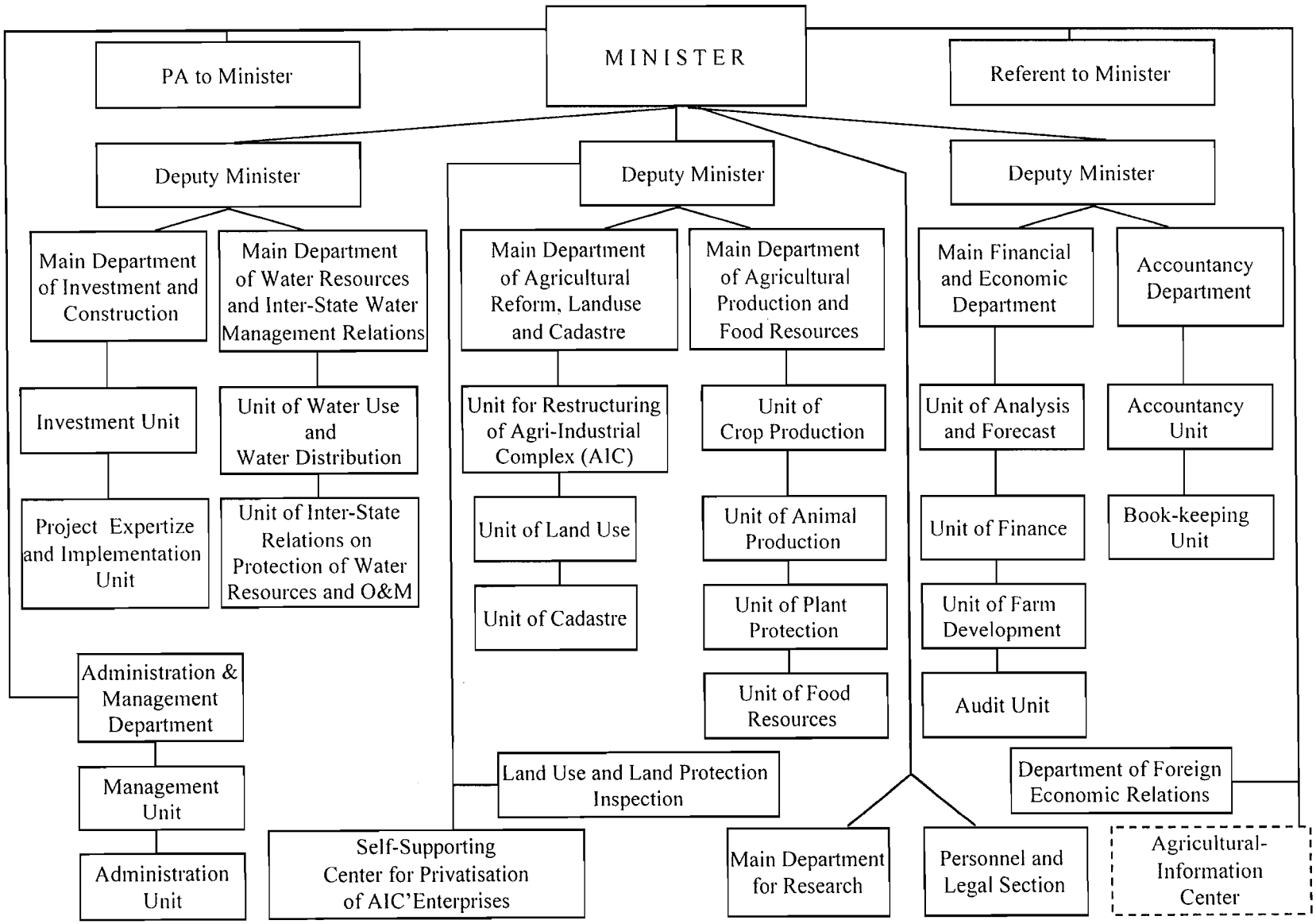
On behalf of the Government of Turkmenistan

Date:


KAZAKHSTAN
UZBEKISTAN
TURKMENISTAN
ISLAMIC REPUBLIC OF IRAN
AFGHANISTAN
CASPIAN SEA
Sarykam Lake
DASHHOVUZ
TURKMENBASHI
Amudaria River
CHARDZEV
Kopetdag Reservoir
ASHGABAT
PROJECT AREA
KARAKUM CANAL
MARY
Zeid Reservoir
Hauzhan Reservoir
LEGEND
International Boundary
Administrative Boundary
Capital
Main City
Main Road
River
Lake / Reservoir
Main Conveyance Canal
Irrigation Area
0 20 40 60 80 100km
N
LOCATION MAP



Organization Chart for Agricultural University of Turkmenistan



Organizational Chart of the Ministry of Agriculture and Water Resources of Turkmenistan
---- existing - - - proposed

Organization Chart of Ministry of Agriculture and Water Resources of Turkmenistan

Terms of Reference
for
Feasibility Study
on
Establishment of Agricultural Training Center
in
Turkmenistan

1. Rationale

Agriculture has long been the significant sector in the economy of Turkmenistan and will continue to be so for the foreseeable future. It accounted for about 30% of GDP in 1995 and provided employment to over 40% including the population engaged in agriculture-related industries. For the further activation of agriculture sector in a high progress of privatization in the agricultural sector, however, the agricultural extension and training system will play an important role and should be established immediately, because this system does not exist except the direct system between farm technical staff and the MAWR official.

In order to formulate the Project for Establishment of Agricultural Training Center, the feasibility study (hereinafter referred to as "the Study") urgently needs to be conducted by specialists.

2. Justification of Japanese Technical Cooperation

Japan is known as one of the most advanced countries in the agricultural extension and training system for the irrigated agricultural development, agricultural supporting system, farmers' organizations, and post-harvest and marketing system of agricultural products. If the feasibility study is conducted under the Japanese technical cooperation, these advanced technologies will be introduced to Turkmenistan through the Study.

3. Objectives of the Study

The objectives of the Study are to formulate a training programs for the government staff concerned and farmers leaders, preliminary design of the buildings of the center and other training facilities, estimate of the project cost and justification of the project through the feasibility study.

4. Study Area

Farm (about 500 ha) of Agricultural University of Turkmenistan, located in Guyar District of Ahal Province (15-km northeast of Ashgabat).

5. Scope of Study

5.1 Detailed Scope of Study

Before pursuing the proposed project, a feasibility study is recommended to be undertaken. The objectives of the feasibility study is to formulate the establishment plan of the project.

The study will cover the following activities:

(a) Survey on agricultural training system including:
  (i) Past and present activities of training, and
  (ii) Present dissemination system for the result of agricultural research to farmers.

(b) Topographic survey in the farm including the plane table survey and route survey along the canals and roads.

(c) Construction material survey.

(d) Identification of the constraints on the present training system.

(e) Study on role and position of the Agricultural Training Center in the agricultural development of the country.

(f) Study on operational principle and activities of the Center.

(g) Preparation of basic plan of the Center including:
  (i) Improvement plan of organizational structures,
  (ii) Study on training principle and program,
  (iii) Preparation of curriculum of training,
  (iv) Facilities and equipment plan, and
  (v) Stage-wise establishment plan, if necessary.

(h) Preliminary design of buildings, irrigation and drainage facilities, experimental farm, demonstration farm, seed multiplication farm, green houses and other training facilities for the Center.

(i) Preparation of operation and maintenance plan for the Center.

(j) Cost estimate and implementation plan.

(k) Project justification.

(l) Preparation of feasibility report.

5.2 Transfer of Technology

Throughout the course of the Study, transfer of technology and training will be provided to counterpart experts by foreign experts in the following fields:

(i) Field survey and investigation for every lines of foreign experts assigned.

(ii) Plan and design for irrigation and drainage facilities, buildings and other training facilities.

(iii) Establishment of training program and curriculum.

(iv) Project justification procedure.

The above transfer of technology will be carried out in the form of on-the-job training and seminar during the course of the Study. In addition to the above transfer of technology, overseas training will also be programmed preferably in Japan.

5.3 Study Schedule

The period required for the Study is estimated at 10 months as shown in Figure 1.

The following foreign experts will be required for the Study:

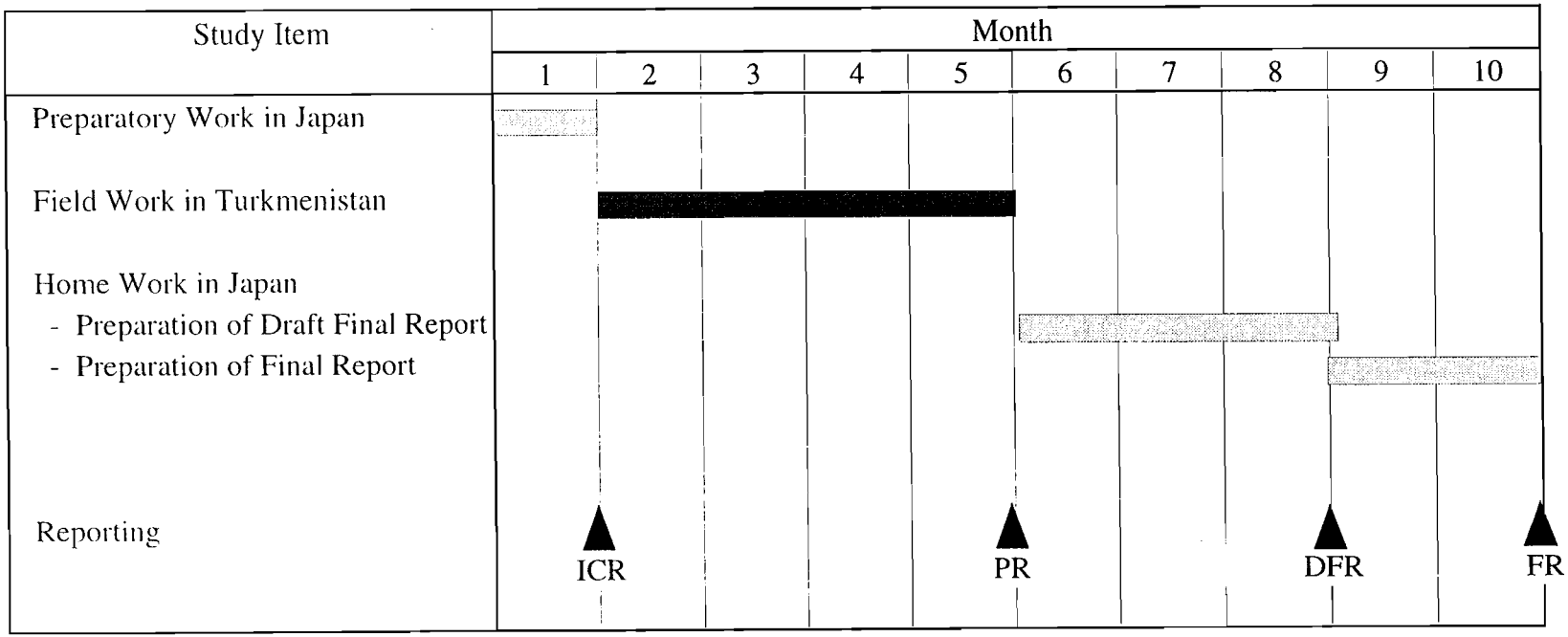
- Team Leader
- Irrigation /Drainage Engineer
- Agronomist
- Agricultural Extension Specialist
- Building Engineer
- Sociologist
- Pedologist
- Soil Mechanical Engineer
- Topographic Engineer
- Design/Cost Estimate Engineer

The required manpower input is estimated to be 45 man-months in total.

5.4 Reports

The results of field survey and study will be compiled in the following reports which will be submitted to the Government of Turkmenistan.

Inception Report	:	within one month after start of the Field Work in Turkmenistan.
Progress Report	:	at the end of the Field Work in Turkmenistan.
Draft Final Report	:	at the end of the Home Work in Japan.
Final Report	:	within one month after getting comments from MAWR on the Draft Final Report.



Tentative Work Schedule

TECHNICAL COOPERATION
BY
THE GOVERNMENT OF JAPAN

APPLICATION

by
The Government of The Republic of Turkmenistan
for
Feasibility Study
on
Establishment of Agricultural Information Center
to
The Government of Japan

1. Project Digest

1.1 Project Title

Establishment of Agricultural Information Center in the Ministry of Agriculture and Water Resources (MAWR) of Turkmenistan.

1.2 Location

In the compound of MAWR, of which location map is presented in Attachment - 1.

1.3 Implementing Agency

MAWR, of which organization chart is as shown in Attachment - 2.

1.4 Desirable Implementation Schedule

(a) Feasibility Study : Approximately 9 months from the middle of 2000

(b) Implementation : Approximately one (1) year in 2003

1.5 Prospective Funding Sources

(a) Feasibility Study (grant) : Japan International Cooperation Agency (JICA)

(b) Implementation (grant) : Japan International Cooperation Agency (JICA)

2. Background and Justification of the Project

2.1 Land and Population

Turkmenistan is a land-locked country bordering Kazakstan in the north, Uzbekistan in the northeast and east, Iran in the south, Afghanistan in the southeast and bounded by the Caspian Sea in the west. The country occupies an area of 488,100 km^2, of which about 90% is occupied by deserts, and extends 1,100 km east to west and 650 km north to south.

Turkmenistan is located in the desert climatic zone and severe continental climate is dominant due to topography. The temperature shows great variances in a day and year. It rarely drops below 35 °C in summer and rises up to 50 °C at Karakum Desert. In winter, the temperature at Kushka drops to -33 °C. The annual precipitation is scarce, below 250 mm over the country and 100 - 110 mm in some areas.

The Amudarya river is the most important water resource of the country. The Amudarya river with a catchment area of 309,000 km^2 originates at the Pamir Plateau, and flows down to Aral Sea through Afghanistan and Turkmenistan. The mean annual discharge of the river is 45 km^3 at Mukry, where the intake point of the Karakum Canal is located.

According to the estimate of World Bank, the population of Turkmenistan in 1995 was 4.6 million, most of which live along the Amudarya river and the Karakum Canal. The population density was 9.0 persons/km^2 in 1995, which is the second lowest among the republics of Former Soviet Union, following Kazakstan. The population growth rate has been 3.9% since 1989. This high growth rate is mainly attributed to the immigration from the other CIS countries. The population of Turkmenistan is comprised of three major nationalities or ethnic groups. The largest is Turkmen which presently accounts for 77.0% of the population, followed by Uzbek (9.2%) and Russians (6.7%).

2.2 National Economy

After independence, Turkmenistan took a gradual economic reform standing apart from the radical reform of Russia, and therefore the collapse of the Russian economic system has not much affected the Turkmen economy. In addition, since Turkmenistan is agricultural country and rich in oil and gas, the country less suffered from the economic depression compared to CIS countries.

Another noticeable point of the Turkmen economy is that the economy in Turkmenistan is much supported by the cotton production and extraction of oil and gas. In the time of the former Soviet Union, the government paid main efforts to the construction of large-scale irrigation system including the Karakum Canal mainly for cotton cultivation, development of gas and oil resources and construction of gas and oil line systems. As a result, the production of cotton and gas has largely increased, and Turkmenistan is now ranked to be the second producing country for both gas and cotton among the countries of the former Soviet Union; after Russia for gas and after Uzbekistan for cotton.

The following table shows the net material product (NMP) by sector in the years from 1992 to 1995:

(Unit: %)

Sector	1992	1993	1994	1995
Agriculture	16.3	12.2	24.2	34.9
Industry	65.1	62.4	40.7	24.8
Construction	9.0	14.3	26.2	14.7
Transportation and communication	3.9	4.6	3.0	5.6
Trade and Services	5.7	6.5	5.9	4.3
Taxes	-	-	-	5.6
Total	100	100	100	100

As mentioned above, the economy of Turkmenistan was developed forcibly depending on the cotton-related or linked to the extraction of gas in the time of the former Soviet Union. After dissolution of the former Soviet Union, however, NMP proportion of industry has decreased, while those of agriculture and construction have increased as shown in the above table. Particularly for the agriculture, diversification of crops from cotton to grains, fruits and vegetables is intended expecting the self sufficiency of food crops.

2.3 Agricultural Sector

Turkmenistan's economy remains primarily agricultural, accounting for 30% of GDP in 1995, and 43% of employment. An additional 10% of the labor force is employed in agriculture-related industries, mostly agribusiness enterprises.

The agriculture in Turkmenistan is almost entirely dependent on irrigation, which covers 1.77 million hectares in 1995. However, these lands have been developed mainly for the cotton cultivation in the Soviet time, and almost all the foodstuffs had been imported from the other CIS countries. After independence, the government is paying its effort to attainment of self sufficiency for foodstuffs through improvement of irrigation facilities and other agricultural infrastructure. As a result, it is reported that the self sufficiency of the foodstuffs will be attained in 1998.

The following table shows the crops and dairy products in the years from 1991 to 1995:

(Unit: '000 tons)

Items	1991	1992	1993	1994	1995
Cereals	517	717	975	1,106	1,294
Cotton	1,443	1,300	1,341	1,283	1,293
Potato	30	34	31	20	21
Vegetables	388	298	286	391	376
Meet	107	98	110	107	111
Milk	458	471	712	716	727
Egg (million nos.)	300	292	267	270	270

According to the above table, the production of cotton has been depressed since 1994. As for the other crops, it is noticeable that the production of cereals is increasing showing 2.1 times of production in 1995 as compared with 1991. Among the cereals, paddy production has already attained the self sufficiency. The double cropping of wheat has started in some

area to attain the self sufficiency. The production of vegetables showed a decreasing tendency from 1992, but has recovered since 1994. As for the fruits, since the government has a plan to export them, the cultivation area and production will increase in near future.

2.4 Problems To Be Solved in Agricultural Sector

For the profitable and sustainable agricultural development in Turkmenistan, the following measures should be taken:

(i) Shift of present monoculture system to the diversified cropping system.

(ii) Increase of foodstuff production.

(iii) Establishment of environmentally sustainable agriculture system.

(iv) Improvement of marketing system.

(v) Rehabilitation and improvement of irrigation and drainage facilities and other agricultural infrastructure.

(vi) Improvement of irrigation water management technology.

(vii) Promotion of rural development and enhancement of farmers' living conditions.

In addition to the above measures, a well-established agricultural training system is needed for the profitable and sustainable agricultural development in the country. In Turkmenistan, there are an ample and wide-ranged data and information on agriculture accumulated in the past. These data and information are very useful to establish an agricultural development policy and program for the government, to research the new agricultural technology for the universities and institutes, and to establish a profitable farming and marketing schedule for farmers. Due to less development of the information system in the country, however, it is difficult for them to approach to these data and information. MAWR, recognizing these circumstances, intends to establish an agricultural information center under the custody of MAWR.

2.5 Outline of the Project

(1) Objective of the Project

The Agricultural Information Center is proposed to be established in MAWR for the following objectives:

(i) To establish and operationalize a nation-wide agricultural information system for provision of comprehensive information including land use, land tenure, crop cultivation, farming practices, water use and supporting facilities, and databases including agricultural policies, research and technology, market development, supply and prices of agricultural crops and livestock and agro-industrial laws.

(ii) To establish a system for monitoring of research activities in the MAWR's regional offices, bureaus, attached agencies and cooperating agencies.

(iii) To introduce a modern information technology enabling users to get highly accurate and fresh data on agricultural performance.

(iv) To establish linkages with MAWR's information offices; universities, colleges, and international and local research and statistical institutions.

(v) To provide assistance to other staff for bureaus, attached agencies and regional offices in the conduct of research and statistical activities.

(vi) To organize and manage training activities and seminars that will promote and improve research communication and statistics information.

(vii) To produce printed materials and periodicals such as news letters, documentation of outstanding research results on agricultural production and marketing relevant to farmers' profitability.

(2) Project Work

For the implementation of the project, the following facilities will be needed:

(i) Construction of buildings for operational offices, storage of databases and laboratories.

(ii) Establishment of computer network among MAWR's information offices and regional offices, universities, colleges, and international and local research and statistical institutions.

(iii) Provision of compatible hardware and software platforms and other equipment.

(iv) Training of staff in the implementation of the project components.

(v) Local and overseas training with respect to the various technical aspects involved.

3. Terms of Reference of the Proposed Study

The terms of reference for the feasibility study on the project is presented in Attachment - 3.

4. Facilities and Information for the JICA Study Team

(1) Assignment of Counterpart Personnel of the Executing Agency for the Study

MAWR will assign counterpart personnel to the JICA Study Team to meet its requirement.

(2) Available data, Information, Documents, Maps, etc.

(i) Agricultural statistics.

(ii) Production year book.

(iii) Previous study reports.

(iv) Land use map

(v) All information available at the offices relevant to the project.

(3) Information on the Security Conditions in the Study Area

There is no security problem in the study area, i.e., in the capital city of Ashgabat.

5. Undertakings of the Government of Turkmenistan

In order to facilitate smooth and efficient execution of the Study, the Government of Turkmenistan shall undertake to:

(a) Secure the safety of the JICA Study Team.

(b) Permit the members of the JICA Study Team to enter, leave and sojourn in the country in connection with their assignment therein, and exempt them from alien registration requirement and consular fees.

(c) Exempt the JICA Study Team from taxes, duties and any other charges on equipment, machinery and other materials brought into and out of the country for conducting the Study.

(d) Exempt the JICA Study Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the JICA Study Team for their services in connection with implementation of the Study.

(e) Provide necessary facilities to the JICA Study Team for remittance as well as utilization of funds introduced into the country from Japan in connection with implementation of the Study.

(f) Secure permission or entry into private properties or restricted areas for the conduct of the Study.

(g) Secure permission for the JICA Study Team to take all data, documents and necessary materials relating to the Study out of the country to Japan.

(h) Provide medical services as needed. Its expenses will be chargeable to the member of the JICA Study Team.

The Government of Turkmenistan shall bear claims, if any arises against member(s) of the JICA Study Team resulting from, occurring in the course of or otherwise connected to the

discharge of their duties in implementation of the Study, except when such claims arise from gross negligence or wilful misconduct on the part of the member(s) of the JICA Study Team.

MAWR shall act as counterpart agency to the JICA Study Team and also as coordinating body in relation with other governmental and non-governmental organisations concerned for smooth implementation of the Study.

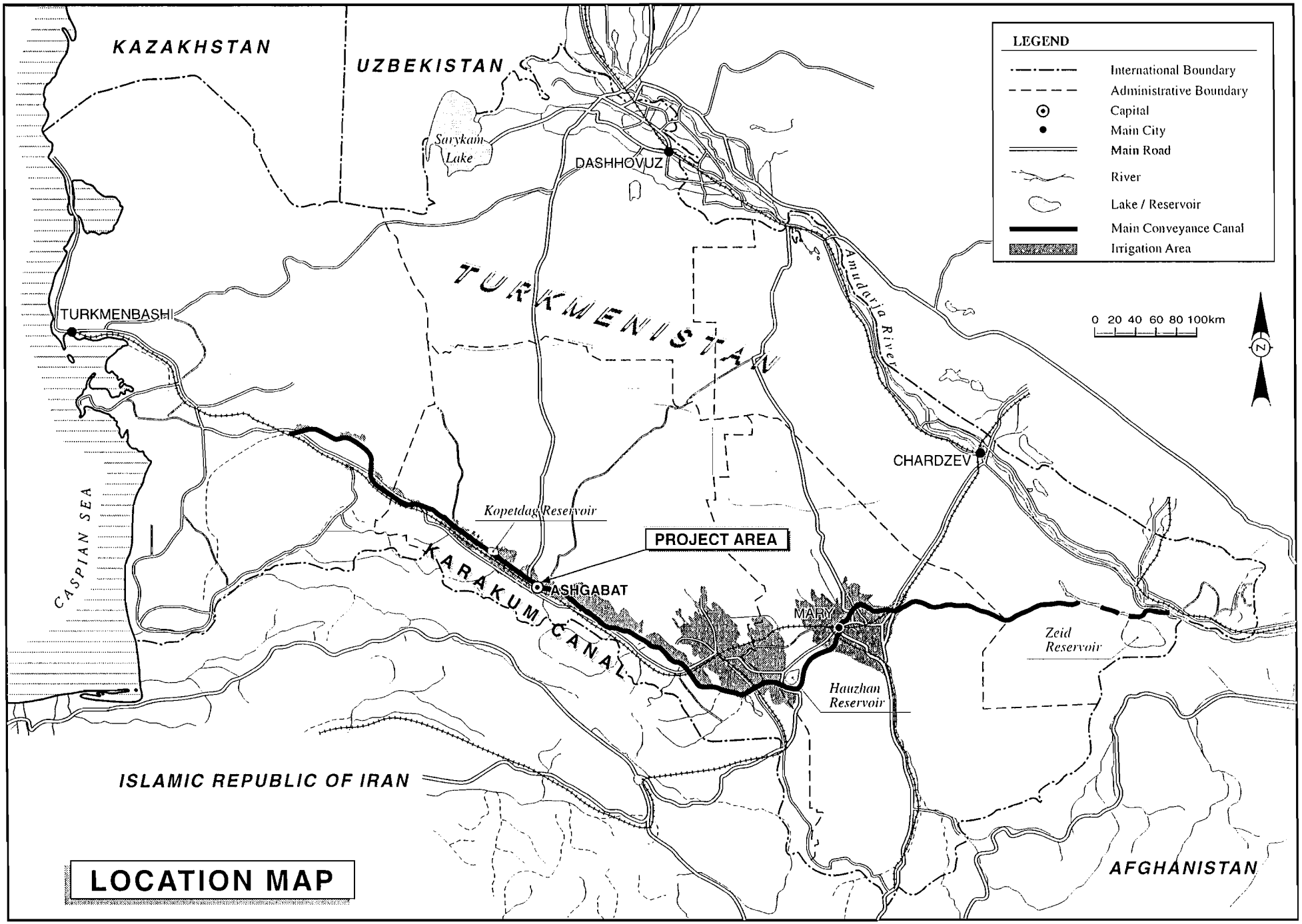
The Government of Turkmenistan assured that the matters referred in this form will enable smooth execution of the Study by the JICA Study Team.

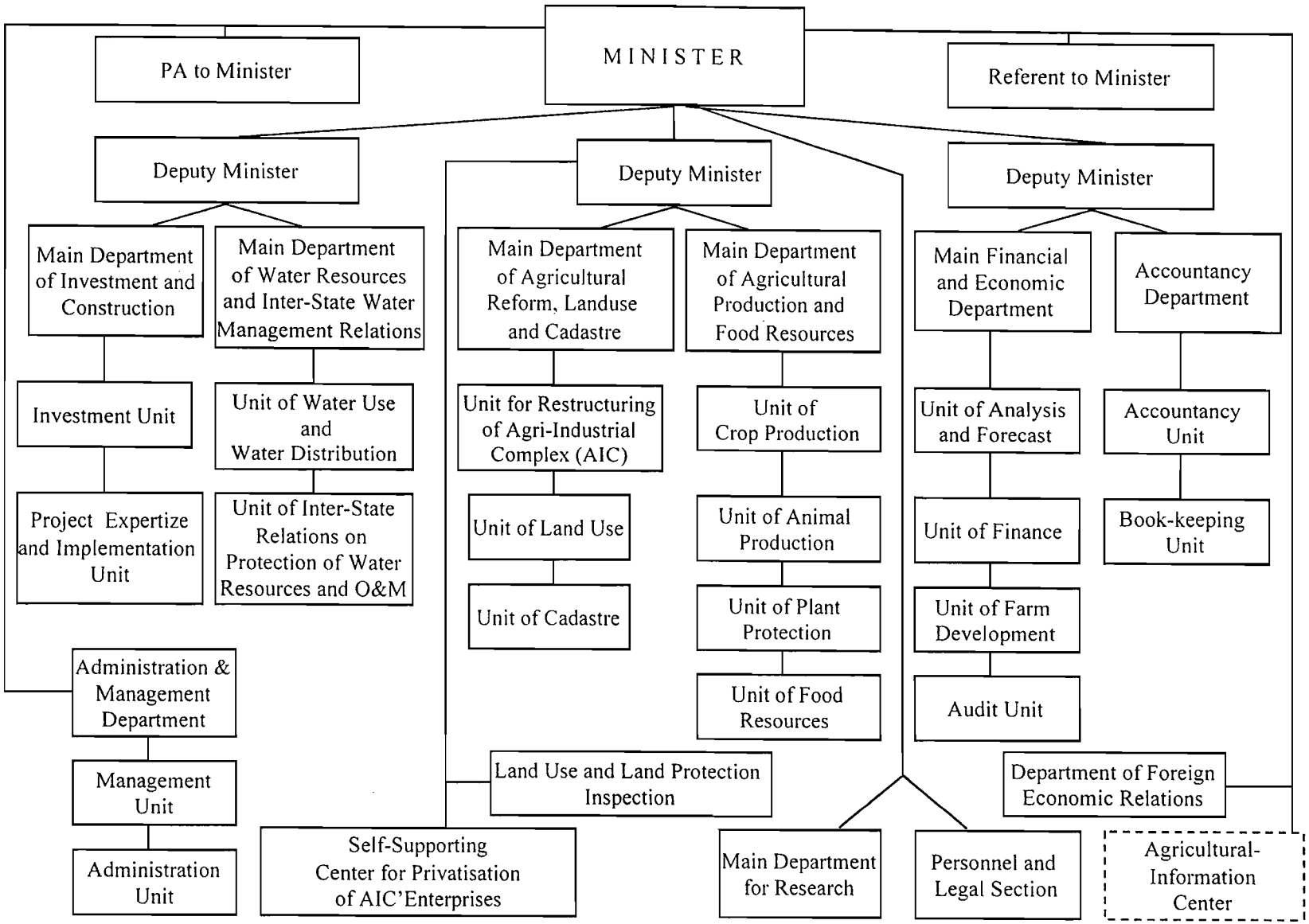
Signed:

Titled:

On behalf of the Government of Turkmenistan

Date:


KAZAKHSTAN
UZBEKISTAN
TURKMENISTAN
ISLAMIC REPUBLIC OF IRAN
AFGHANISTAN
CASPIAN SEA
Sarykam Lake
DASHHOVUZ
TURKMENBASHI
Amudarja River
CHARDZEV
Kopetdag Reservoir
PROJECT AREA
KARAKUM CANAL
ASHGABAT
MARY
Zeid Reservoir
Hauzhan Reservoir
LEGEND
International Boundary
Administrative Boundary
Capital
Main City
Main Road
River
Lake / Reservoir
Main Conveyance Canal
Irrigation Area
0 20 40 60 80 100km
N
LOCATION MAP



Organizational Chart of the Ministry of Agriculture and Water Resources of Turkmenistan
---- existing - - - proposed

Organization Chart of Ministry of Agriculture and Water Resources of Turkmenistan

Terms of Reference
for
Feasibility Study
on
Establishment of Agricultural Information Center
in
Ministry of Agriculture and Water Resource of Turkmenistan

1. Rationale

In Turkmenistan, there are an ample and wide-ranged data and information on agriculture accumulated in the past. These data and information are very useful to establish an agricultural development policy and program for the government, to research the new agricultural technology for the universities and institutes and to establish a profitable farming and marketing schedule for farmers. Due to less development of the information system in the country, however, it is difficult for them to approach to these data and information. MAWR, recognizing these circumstances, intends to establish an agricultural information center under the custody of MAWR.

In order to formulate the Project for Establishment of Agricultural Information Center in MAWR, the feasibility study (hereinafter referred to as "the Study") urgently needs to be conducted by specialists.

2. Justification of Japanese Technical Cooperation

Japan is known as one of the most advanced countries in the agricultural information system for provision of comprehensive information including land use, land tenure, crop cultivation, farming practices, water use and supporting facilities, and databases including agricultural policies, research and technology, market development, supply and prices of agricultural crops and livestock and agro-industrial laws. If the feasibility study is conducted under the Japanese technical cooperation, these advanced technologies will be introduced to Turkmenistan through the Study.

3. Objectives of the Study

The objectives of the Study are to formulate a nation-wide agricultural information system in Turkmenistan, preliminary design of the buildings of the center and other training facilities, estimate of the project cost and justification of the project through the feasibility study.

4. Study Area

Ashgabat, the capital of Turkmenistan.

5. Scope of Study

5.1 Detailed Scope of Study

Before pursuing the proposed project, a feasibility study is recommended to be undertaken. The objectives of the feasibility study is to formulate the establishment plan of the project, which will serve to strengthen the MAWR's operation in data management and research utilization by providing appropriate facilities and infrastructure for proper and faster dissemination of relevant information to various end-users.

The study will cover the following activities:

(a) Survey on agricultural statistic management and information system including:
  (i) past and present statistic activities,
  (ii) statistic data processing, and
  (iii) statistical information release system.

(b) Survey on current status of existing research stations including:
  (i) inventory of the existing research stations,
  (ii) agricultural research management and information system,
  (iii) past and present research activities, and
  (iv) research results monitoring activities.

(c) Survey on the linkage with MAWR's information offices, universities, colleges, and international and local research and statistical institutions.

(d) Survey on current situation of the linkage between extension and research.

(e) Survey on present telecommunication system including:
  (i) national telecommunication system, and
  (ii) MAWR's internal communication system including:
    - MAWR's central office and regional/provincial offices, and
    - MAWR's offices and research institutions.

(f) Identification of the constraints on the present agricultural information system.

(g) Preparation of basic plan of agricultural information system including:
  (i) improvement plan of organizational structures,
  (ii) facilities and equipment plan, and
  (iii) stage-wise establishment plan, if necessary.

(h) Preliminary design of facilities and equipment of proposed system.

(i) Preparation of operation and maintenance plan for the proposed system.

(j) Cost estimate and implementation plan.

(k) Project justification.

(l) Preparation of feasibility report.

5.2 Transfer of Technology

Throughout the course of the Study, transfer of technology and training will be provided to counterpart experts by foreign experts in the following fields:

(i) Field survey and investigation for every lines of foreign experts assigned.

(ii) Plan and design for buildings and other training facilities.

(iii) Establishment of information system..

(iv) Project justification procedure.

The above transfer of technology will be carried out in the form of on-the-job training and seminar during the course of the Study. In addition to the above transfer of technology, overseas training will also be programmed preferably in Japan.

5.3 Study Schedule

The period required for the Study is estimated at 9 months as shown in Figure 1.

The following foreign experts will be required for the Study:

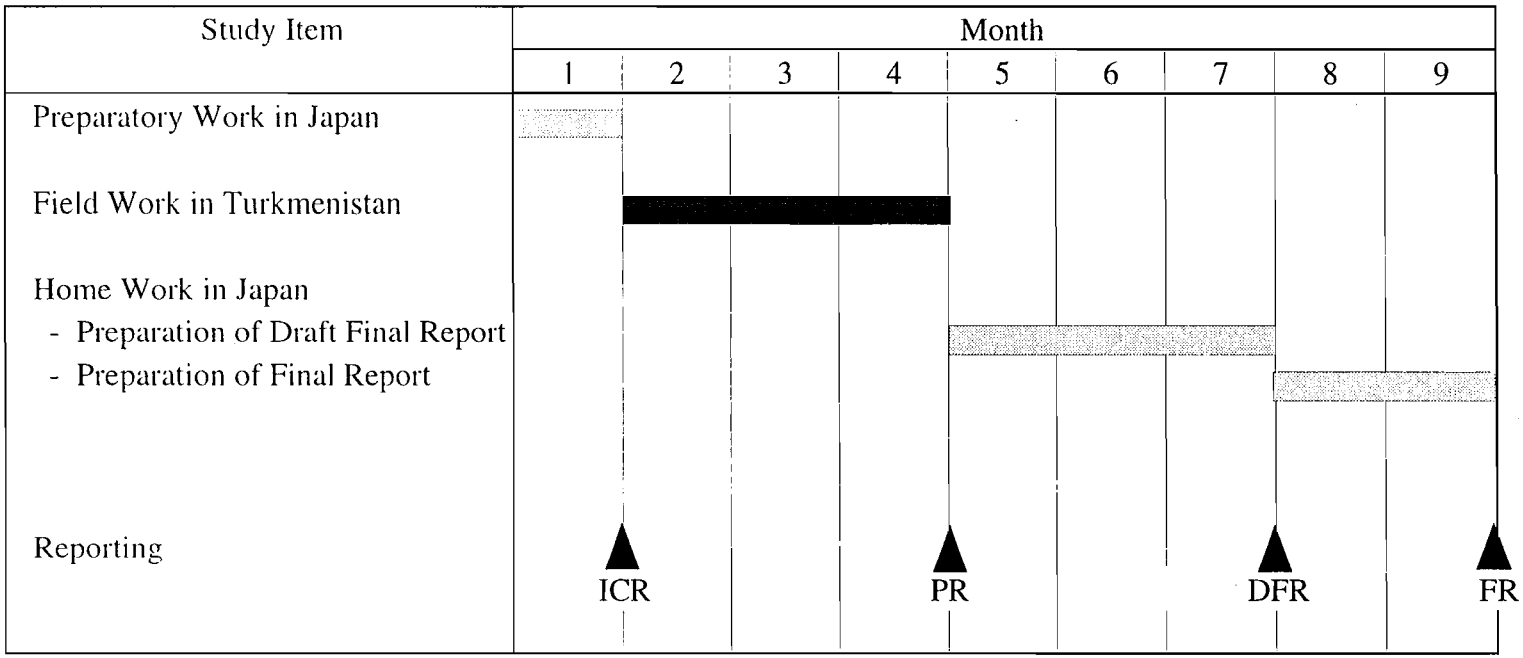
- Team Leader
- Information Technology Expert
- Soil and Land Use Expert
- Agronomist
- Agro-economist
- Institutional Expert
- System Engineer
- Design/Cost Estimate Engineer

The required manpower input is estimated to be 45 man-months in total.

5.4 Reports

The results of field survey and study will be compiled in the following reports which will be submitted to the Government of Turkmenistan.

Inception Report	:	within one month after start of the Field Work in Turkmenistan.
Progress Report	:	at the end of the Field Work in Turkmenistan.
Draft Final Report	:	at the end of the Home Work in Japan.
Final Report	:	within one month after getting comments from MAWR on the Draft Final Report.



Note:
: Work in Turkmenistan
: Work in Japan

ICR : Inception Report
PR : Progress Report
DFR : Draft Final Report
FR : Final Report

Tentative Work Schedule

Figure - 1

添付資料

1. 調査団調査行程表
2. 面談者リスト
3. 現地調査写真集
4. 調査団長略歴

調査団調査行程表

日順	年/月/日	曜日	作業内容	宿泊地	備考
1	6月8日	火	移動（成田 - アルマティ）	アルマティ	KE002 - OZ5775 (15:55 - 01:40+1)
2	6月9日	水	大使館およびアルマティ市長表敬 収穫後処理施設および流通に関する資料収集	アルマティ	
3	6月10日	木	現地調査および追加資料収集 シムケントに移動	シムケント	空路
4	6月11日	金	コクサライ・ダム地点踏査	シムケント	
5	6月12日	土	シムケント設計院および州水資源部にて資料収集 アルマティに移動	アルマティ	空路
6	6月13日	日	アスタナに移動	アスタナ	空路
7	6月14日	月	農業大臣、水資源委員会表敬、稲垣と面談 現地調査	アスタナ	
8	6月15日	火	現地調査 アルマティに移動	アルマティ	空路
9	6月16日	水	資料収集	アルマティ	
10	6月17日	木	アルマティ周辺農家調査	アルマティ	
11	6月18日	金	アルマティ市内市場調査 資料収集	アルマティ	
12	6月19日	土	収集資料整理	アルマティ	
13	6月20日	日	収集資料整理	アルマティ	
14	6月21日	月	日本大使館館に調査結果の報告	アルマティ	
15	6月22日	火	タシケントに移動 日本大使館、JICA事務所表敬	タシケント	Uzubekistan Air (7:05 - 10:50)
16	6月23日	水	農業省表敬 資料収集	タシケント	
17	6月24日	木	フェルガナに移動 現場調査	フェルガナ	空路
18	6月25日	金	現場調査 タシケントに移動	タシケント	空路
19	6月26日	土	収集資料整理	タシケント	
20	6月27日	日	収集資料整理	タシケント	
21	6月28日	月	農業省、日本大使館およびJICAに調査結果報告	タシケント	
22	6月29日	火	追加資料収集	タシケント	
23	6月30日	水	調査結果の纏め	タシケント	
24	7月1日	木	アシュガバードに移動 農業省に表敬、関連資料収集	アシュガバード	Uzubekistan Air (7:00 - 9:00)
25	7月2日	金	関連資料収集 設計院表敬	アシュガバード	
26	7月3日	土	調査結果の纏め	アシュガバード	
27	7月4日	日	モスクワに移動	モスクワ	T5702 (7:40 - 10:45)
28	7月5日	月	帰国		SU575 (19:05 - 9:40+1)
29	7月6日	火		日本	

面談者リスト

1. カザフスタン国

日本大使館	館山　彰氏	参事官
	渡辺女史	書記官
農業省	Mr. Karibjanov	副首相/農業省大臣
	Mr. Sarsem Bekov	水資源委員会委員長
	Mr. Shotanov	PIU 局長
戦略計画改革庁	稲垣　富一氏	JICA 専門家
アルマティ市	Mr. Bukenov	副市長
設計院	Mr. Dmitriev	委員長
南カザフスタン州	Mr. Hamitjan Pulatov、	南カザフスタン州水資源委員会委員長
	Mr. Almaz Junusov	シムケント設計院委員長

2. ウズベキスタン国

日本大使館	吉尾氏	書記官
JICA 事務所	田辺氏	副所長
	相原氏	Project Formulation Adviser
農業・水管理省	Mr. Zhalalov	農業・水管理省次官
	Mr. Azimov	農業省水路維持管理局長
	Mr. Mirkhodjiev	水路改修局長
科学生産委員会	Dr. Ikramob	委員長
フェルガナ州	Mr. Azamjon	州水路維持管理局長
	Mr. Mahamadjon	州農業・維持管理局次長
	Mr. Kim	州設計院技師長
	Mr. Peter Reddish	TACIS チーム・リーダー
	Mr. Rafael	ADB タシケント事務所所長

3. トルクメニスタン国

農業・水資源省	Mr. Babaev	農業省次官/農業大学学長
	Mr. Yakshimuradov	対外関係局長
設計院	Mr. Krohmal	設計院副委員長

アルマティ州農産物生産基盤・流通システム整備計画

アルマティ市場内部

卸売りと小売りが混在

路上市場

アルマティ市内にある保冷倉庫の事務所

保冷倉庫外観

保冷倉庫内部

新首都近郊農業・農村開発計画

アスタナ市より 12km 南東にあるキュゲンジャール国営農場住宅

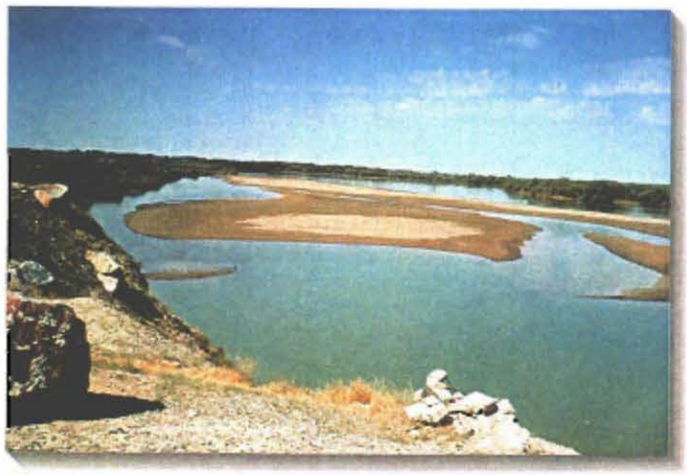
キュゲンジャール国営農場風景

アスタナ市より 50km 南東にあるカイサル民営農場内に世銀ローンによって設置されたピボット・マシン

コクサライ・ダム灌漑農業・環境改善計画

最上流案でのダム地点

最上流案での水没地域



最下流案でのダム地点

フェルガナ州排水改良・貧困地域農業振興計画

フェルガナ州内での住宅の密集状況

地下水排除用ポンプ

地下水の上昇により発芽率 50% 以下の棉畑

地下水上昇により倒壊した住宅

トルクメニスタン農業大学農業訓練センター設立計画

トルクメニスタン農業大学農場建物全景

予算不足により殆ど使用されていない農場

農場内灌漑用ポンプ場

調査団長略歴

富田 俊宏	略　歴
昭和15年7月19日生	
昭和40年3月	東京教育大学農学部農業工学科卒業
昭和40年4月	日本公営株式会社(農業部)入社
昭和46年1月	計画部
昭和51年1月	カトマンズ事務所
昭和52年10月	計画部
昭和53年11月	農業水利部
昭和58年4月	第一農業水利部　課長
昭和60年3月	コメリン開発事務所　所長
昭和63年10月	第一農業水利部　部長代理
平成2年10月	第一農業水利部　課長
平成3年2月	農業水利部　部長
平成6年7月	第三事業部　次長
平成7年7月	国際事業部　部付
平成10年4月	技術本部　技師長
平成11年4月	国際事業本部部　技師長

主な海外業務実績

案件名	対象国	従事期間	担当業務
ファンラン潅漑拡張計画	ベトナム	昭和41年3月 － 昭和43年3月	施設設計
テェップニュット農業開発	ベトナム	昭和46年8月 － 昭和48年5月	潅漑排水計画
東メスケネ潅漑計画	シリア	昭和49年9月 － 昭和50年12月	潅漑排水計画
ナラヤニ潅漑計画	ネパール	昭和51年1月 － 昭和54年6月	所長
コメリン川上流域水資源開発計画	インドネシア	昭和54年9月 － 昭和57年3月	副総括
パサック河上流域中規模潅漑開発計	タイ	昭和57年7月 － 昭和57年12月	潅漑排水計画
ナラヤニ潅漑拡張計画	ネパール	昭和58年1月 － 昭和59年6月	所長
コメリン川上流域潅漑開発計画	インドネシア	昭和60年3月 － 平成2年9月	所長
ビルガンジ地下水潅漑開発計画	ネパール	平成4年12月 － 平成5年9月	総括
ヌジ川流域農村総合開発計画	ｺｰﾄｼﾞﾎﾞｱｰﾙ	平成5年8月 － 平成6年1月	副総括
クチュクメンデレス川流域潅漑開発計	トルコ	平成7年2月 － 平成8年3月	副総括
クジル・オルダ地区潅漑開発計画	カザフスタン	平成8年8月 － 平成10年3月	総括
黄河三角州農業総合開発事業	中国	平成10年12月 － 平成11年3月	総括