

トルコ共和国
カザフスタン共和国

プロジェクト・ファイナニング調査報告書

トルコ共和国	メリチ・エルゲネ流域農業開発計画
	バリケシル・マンヤス平野農業開発計画
カザフスタン共和国	南カザフスタン州灌漑排水改良計画

平成8年5月

社団法人 海外農業開発コンサルタント協会

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まえがき

本報告書は、1996年5月4日より同年5月22日までの19日間に亘って、トルコ共和国およびカザフスタン共和国において実施した以下の3件の開発計画に関するプロジェクト・ファインディング調査結果を取り纏めたものである。

トルコ共和国

- (1) メリチ・エルゲネ流域農業開発計画
- (2) バリケシル・マンヤス平野農業開発計画

カザフスタン共和国

- (3) 南カザフスタン州灌漑排水改良計画

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農業／農業経済 和田 源七（日本工営株式会社）

調査団は、トルコ共和国およびカザフスタン共和国における現地調査および資料収集において、両国政府関係機関のご協力を頂き、全ての業務を円滑に遂行することができた。調査団の受け入れ窓口としてご協力頂いたのは、トルコ共和国では村落総局（GDRS）であり、また、カザフスタン共和国では農業省計画実施局（PIU）であった。これらの政府関係機関に加えて、在トルコ共和国日本大使館、JICA事務所、並びに在カザフスタン共和国日本大使館の方々に多大なご助言とご協力を頂いた。ここに関係各位の方々に深甚なる謝意を表する次第である。

調査団の調査日程、面会者のリストは添付資料－1 および2 にそれぞれ示すとおりである。

トルコ共和国・カザフスタン共和国
プロジェクト・ファインディング調査報告書

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A トルコ編

A. トルコ共和国編

1 一般経済および農業の背景

1.1 土地と人的資源

トルコはアジアとヨーロッパの2つの大陸にまたがり、国土総面積779,000km²のうち、アジア大陸に755,000km²を、また、ヨーロッパ大陸側に24,000km²を占めている。

この国の気候は湾岸地域では比較的穏やかであり、内陸部のアナトリア地域では雨量が少なく、夏の猛暑と冬の厳寒を特徴とする厳しい気候である。年平均雨量は300mmから700mmの範囲にあり、冬から春にかけてその大部分が降る。

全耕地面積は国土の36%に相当する約27.7百万 haであり、これは休耕地5.3百万 haを含んでいる。9.3百万 haを占めるその他の土地利用区分には、市街地、河川敷、湿地および湖などが含まれている。

トルコの人口は1990年に約56.5百万人であった。この内約23.2百万人（41%）が農村部に住み、残りの33.3百万人（59%）が都市部に住んでいる。1990年の人口密度は73人/km²と推定されている。年人口増加率は、農村部で0.67%、都市部で3.59%となっており、かなりの差が認められる。このような差は農村部から都市部への人口流出が原因となっている。

1.2 国家経済

1981年から1992年までの11年間における部門別総生産の年平均成長率は、工業部門6.6%、農業部門2.7%、サービス部門4.7%となっている。また、1960年から1992年までの各部門の総生産に対する割合は、工業部門は36%から51%に、サービス部門は16%から26%に上がっているのに対して、農業部門は逆に42%から17%に下がっている。

国民総生産に対する農業部門の割合は下がっているとはいえ、この部門の国家経済における役割は大きい。1992年の統計によれば、全人口の41%は農村部に住み、また、就業人口の44%は農業に従事している。さらに綿製品、加工食品等を含めた農産物は輸出向け製品の重要な部分を占めている。

1980年には29.1億ドルであった輸出額は1993年には153.0億ドルにまで伸びた。一方、消費財を中心に輸入額も伸び、1980年に79.1億ドルであった輸入額が1993年には294.0億ドルとなった。その結果、1993年の貿易赤字は14,083百万ドルに拡大した。

1.3 農業現況

トルコにおける農業生産は自作農を基本単位とし、共同作付けを行っている農家や小作農は一部の地域に限定されているに過ぎない。1990年に実施された農業センサスによれば、全農家の60%は耕作面積が5.0 ha以下であり、その全国平均は5.3 haである。また、農地の細分化も進んでおり、1カ所にまとまった農地を持つ農家は全農家の約15%に過ぎず、4カ所以上に分散した農地を持つ農家が約60%を占めている状況で、効率的な農業経営を行う上で

大きな障害になっている。

トルコでは自作農の割合が高いと同時に、農業従事者のほとんどが家族労働で賄われている。1994年のOECD報告書によれば、16歳以下の子供が季節労働者として重要な働き手となっている。このため、農業従事者の教育レベルが低く、農村部における問題となっている。また、農業部門は余剰労働力の重要な受け皿ともなっている。

穀類はトルコにおける最も主要な畑作物である。耕作面積別では、穀類が最も大きく、続いて豆類、工芸作物、油脂作物、果樹、園芸作物の順となっている。農業生産性は、地域的な相違が大きく、一般的に湾岸地域で高く、東部の内陸部では低い傾向にある。トルコ国の主要穀類である小麦、大麦およびトウモロコシの生産量は、大旱魃のため1989年に22.7百万トンまで落ち込んだが、1990年から93年にかけてはほぼ30百万トンに回復した。綿、砂糖大根およびタバコは単に工芸作物というだけでなく、輸出用の商品作物としても重要である。価格支持政策の下、砂糖大根およびタバコの実産量は伸びているが、綿の実産量は最近減少傾向にある。生野菜、青果等の園芸作物の輸出量は近年著しく伸び、1992年にはその輸出量が800,000トンを超え、農業生産物の輸出総額の10%を占めるようになった。

トルコにおける農家の90%以上は農畜複合経営農家である。主要な畜産生産物は牛乳、羊肉および牛肉である。家畜頭数は1989年の70百万頭から1993年の61百万頭に減少した。肉の生産は1989年から93年にかけて20%程度減少したが、改良品種の導入により牛乳生産は約8.0%増加した。

1.4 農業政策

経済開発五カ年計画に基づきトルコ国の農業政策は実施されている。農業に関連する五カ年計画の基本目標は、(i) 人口増加に見合う必要栄養摂取量の確保、(ii) 収量および生産量の向上、(iii) 気候変動に対する農業生産の安定性確保、(iv) 輸出農産物の開発および強化、および(v) 農村部の開発等である。

現在トルコでは、米を除いて食糧自給をほぼ達成している。自給を維持していくためには近年の著しい人口増加の伸びに対して、これに見合う農作物生産量の増加を図る必要がある。特に、トルコでは主に穀類、果物および野菜から栄養を摂取しており、動物性蛋白質の摂取割合は低い。したがって、動物性蛋白質の摂取をヨーロッパ諸国レベルまでに引き上げることも長期的な目標としている。

耕作地の拡大は近年では限界に達し、さらなる農業生産量の拡大には休耕地の削減と収量の増加を中心に実施する必要がある。第6次経済開発五カ年計画では農産物生産の伸びを年率3.7%に、畜産物の伸びを年率4.9%とし、全農業生産物の伸びを年率4.2%と設定した。トルコ政府はハイブリット等の高収量品種の導入、農薬および化学肥料の使用および灌漑面積の拡大等を促進し、農産物の生産拡大を図ることとしている。一方、畜産物の生産拡大は、飼料作物の生産拡大と高生産品種の導入等により達成することを目指している。

旱魃等の気候変動によりしばしばトルコの農業は打撃を受けている。気象変動に見舞われても安定的な農業生産量を確保するためには、灌漑の導入が最も効果的である。トルコ農業における灌漑の重要性から、1961年に開始した第1次経済開発五カ年計画以来、灌漑面積の拡大は重要課題として取り上げられてきた。第6次経済開発五カ年計画では、最終年までに

灌漑面積を53.4%増やすことを目標とした。

農村部の生活水準を向上し、また、都市部への人口の流出を低減するための方策として、農村部における経済および社会基盤施設の強化はトルコにおいては重要な課題となっている。特に、交通・通信施設の整備が重視されている。また、施設の整備と共に教育、保健および公衆衛生等の公共サービス部門の強化も重視されている。

さらに、トルコ政府は農業生産性拡大のため、生産者価格の支持および農業資材購入資金の補助などに力を入れている。

1.5 本計画の実施機関および関連機関

本計画の実施機関は村落総局(GDRS)である。この総局は当初は土壤保全灌漑組織(TOPRAKSU)、地方定住組織(TOPRAKSU-ISKAN)および地方道路・給水・給電組織(YOLSU ELEKTRIK)を統合して農業村落省(MARA)の下に組織されたが、現在では首相府の管轄下にある。

GDRSは、図-1に示すとおり13部局および22地方局から成り、地方道、村落給水、公共建物、小規模溜池、灌漑水量500 lit/sec以下または1,000 ha以下の小規模灌漑および圃場整備に関して責任を有する。

なお、本計画を成功させるためには、GDRSに加えて国家水利総局(DSI)および農業村落省(MARA)も関連機関として本計画に参画する必要がある。これら機関の組織図は図-2および3に示すとおりである。

2. メリチ・エルゲネ流域農業開発計画

2.1 計画対象地域現況

(1) 位置および行政

本計画対象地域はトルコ西北部のエディルネ県にあり、イスタンブールより約240 km西方に位置する。また、地域を流れる最大河川メリチ川はギリシャとの国境となっている。地域の主要都市はエディルネ（エディルネ県の県庁所在地）であり、イスタンブールとは国道100号線で結ばれている。また、計画対象地域には約60カ村にまたがっており、総人口は110,000人である。

(2) 計画対象面積

計画対象面積は、メリチ川およびその最大支流であるエルゲネ川沿いに広がる地域120,000ha内にあり、DSI,GDRS および農民自身により建設された施設により灌漑されている22,000ha、およびこれらの灌漑地区に関連する農村地域とする。

(3) 自然条件

(a) 地形

計画対象地区は、メリチ川およびエルゲネ川沿いに発達した沖積平野の一部である120,000haに散在している。これら沖積平野の地形は一般的に平坦であり、その平均勾配は0～2.0%で両河川に向かって傾斜している。この地区の排水性は、上記河川の合流点近くを除いて一般的に良好である。

(b) 気候

計画対象地域は大陸性気候帯に属し、高温で乾燥した夏と低温で雨の多い冬によって特徴付けられる。エディルネにおける観測データによれば、流域における年平均降水量は602mmで、この約80%は11月から4月までの6カ月間に降る。

(c) 水源

計画対象地域の主な水源は、メリチ川とその支流のエルゲネ川およびトゥンジャ川で、その年総流出量は65億m³にもおよぶ。地下水源は、流域北部で特に豊富であり、流域全体における開発可能水量は約8,500万m³と見積もられる。

(d) 土壌

計画対象地域における土壌は、メリチ川とエルゲネ川合流点付近（粒度は細かく、排水性に乏しく塩を多く含む）を除いて、粒度は粗く、また、その土層も深く排水性は良い。灌漑適性は、メリチ川とエルゲネ川合流点付近がクラスIVに含まれる他は、全てクラスIまたはIIに含まれる。

(4) 社会基盤整備状況

(a) 交通

計画地区内における主要道路網は国道100号線で、その他にも県道が良く発達している。これらの道路は全てアスファルトで舗装されており、維持管理も良く行き届いている。一方、農村道は無計画に造られ、また、無舗装で構造物が壊れているものが多い。

(b) 電気

流域内における電化は進んでおり、殆ど全ての家庭に電力が供給されている。

(c) 電話

流域内における電話施設は広く行き渡っており、半数以上の家庭は電話を備えている。

(d) 村落給水

計画地区内の都市部では殆ど全てに亘ってパイプ給水システムが整備されているが、農村部では井戸もしくは湧き水から直接水を取り利用している。

(e) 村落排水

各家庭からの下水は吸い込み方式で処理されているか、または下水パイプによって結ばれているが、処理されずに川または窪地にそのまま流されているケースが大部分である。

(f) 集会施設

計画地区内の殆ど全ての市町の役場には集会場と会議室が設置されており、住民の集会の為に利用されているが、農村部においては、協同組合の事務所または喫茶場があり、通常集会等はここで開催されている。

(5) 農業の現況

メリチ・エルゲネ川流域は古くからトルコにおける米の主産地として発展してきた地域であり、灌漑地区（全耕地の約44%）の約90%が水田として利用されている。水稻の他に、小麦、ヒマワリ、砂糖大根、豆類、スイカ、トウモロコシ、牧草等が栽培されている。これら農産物の生産に加えて、本流域においては畜産も主要な産業の一つである。農家は家畜を運搬や耕耘に利用するとともに畜産物による収入を得ている。主要な家畜は、牛、羊、山羊およびニワトリ等である。

本地域はトルコにおける先進農業地帯であるにも拘らず、その生産性高いとは言えない。その理由として、以下の事柄が挙げられる。

- 経営規模の零細性と所有地の分散化
- 若い世代の流出
- 不適切な営農
- 妥当価格より低い農産物価格
- 末端灌漑施設および農地整備の遅れ

- 水利組合設立の遅れ

GDRSは、上記事項のうち、末端灌漑施設および換地も含めた農地整備を最優先課題とし、パイロット・プロジェクトとして、流域内に5カ村を選び約2,400haを対象に事業を実施した。更に4カ村を選び3,200haを対象に現在実施中である。事業実施完了地区の評価によれば、事業実施前と比較し、末端灌漑施設の整備により用水量は約20%節約され、また、換地により営農費は約30%減少したとされている。

2.2 開発構想

(1) 計画の目的

本計画の目的は、(i) 農地整備を行うことにより作業効率および灌漑用水の配水効率を高めること、(ii) 排水施設の建設を行うことにより土地の生産性を高めること、(iii) 灌漑地区に先進的営農体系を導入すること、(iv) 水管理と施設の運営・維持に有効な管理体制を確立すること、および(iv) 農村インフラを整備することにより地域農民の定住促進、生活向上を計ることにある。

(2) 農地整備計画

農地の現況を考慮し、以下の作業を含む農地整備を行うものとする。

(a) 換地

地区における農地の分散はひどく、1農家で20カ所以上に分散して農地を保有しているケースが多々見られる。将来農作業の効率を上げる目的で換地事業が必要となろう。

(b) 区画整理

現況における区画の形状・面積等は将来想定される本格的な機械化営農作業体系からみて十分な条件を備えていないことから、将来区画整理を行う必要があろう。

(c) 農道整備

農道の密度が低く道路に接していない筆も多く、また、道路の幅員が狭い上に屈曲していることから、農道の整備を行う必要があろう。

(d) 用水施設の整備

既存灌漑施設の改修に加えて、殆どの圃場において小水路等の配水施設の整備が必要となろう。特に畑作においては、スプリンクラー、ドリップ灌漑等節水灌漑システム導入の可能性の検討も必要となろう。

(e) 排水施設の整備

殆どの圃場において排水組織、施設（落水工、暗きょ排水、小排水路、排水ポンプ等）が整備されておらず、土地・労働生産性の向上を阻害していることから、排水施設の完備が不可欠となろう。

(3) 先進営農体系導入計画

高収益作物の選定、稲作を中心とした作付けの多様化、肥料および農薬の適正施用、収穫後処理および流通システムの改良を含む改良農法の導入を計ると同時に、試験研究、農業普及、農業金融等を含む農業支援サービスの改善、村落開発協同組合、農業信用組合、農産物販売協同組合等の改善と指導が必要となろう。

(4) 水管理組織導入計画

小規模灌漑地区ではGDRS指導で灌漑協同組合が設立されており、また、大規模灌漑地区では現在DSIの指導で水利組合を組織中であるが、公平な水配分、施設の運営・維持管理、水利費の徴収等を更に効率良く的確に行うためには現存の組織の見直しおよび組合に対する指導が必要となろう。

(5) 農村基盤整備計画

農村基盤整備のコンポーネントとしては、上水施設、農村道路、農産物集出荷・貯蔵施設、精米施設、集会所、下水処理施設、レクリエーション広場等が考えられる。計画ではこれら施設の必要性、適正規模の検討が必要となろう。

2.3 総合所見

(1) 事業の特徴と意義

本開発計画地域のあるエディルネ県はトルコにおける米の最大供給基地であり、栽培面積で国全体（55,000ha）の39%、また、全生産量（140,000トン）の38%をしめている。しかしながら、その単位収量は2.55トン/haとかなり低い。一方、1993年における米の全需要は423,000トンとなっており、その不足分の輸入に年間8,500万ドルを費やしている。このような状況から、本計画地域を中心にパイロット事業として水田灌漑施設の整備および先進稲作技術の導入を行うことは意義がある。

上記事項に加えて、灌漑施設の維持管理に関する技術移転も必要となろう。これまでは大型灌漑施設の運営・維持管理は実施主体であったDSIが行ってきたが、受益農民への移管を進めている。このため受益農民が水管理組合を設立して、水管理と施設の維持管理を行うことになる。水管理組合の設立と施設の移管は進捗しているが、水管理と維持管理に関する技術的側面と資金的な背景を含めた組合の運営面で困難が予想されている。今後の農業政策では、灌漑施設の運営が受益者である農民が主体となって運営する形態が中心となることから、本計画を通して、農民に施設の維持管理手法・技術を習得せしめることは意義がある。

(2) 相手政府の意向

トルコ政府の当事業に対する高い優先度はGDRSの灌漑局長および担当職員との面談を通して確認できた。なお、GDRSは、計画実施の第一段階として、数カ村を選びパイロット事業として取り上げたい意向を持っている。同時にGDRSは、当事業に対する日本政府の技術および資金援助を望んでおり、ADCA調査団としても当事業を日本政府の優良なODA案件として取り上げることが望ましいと判断する。

3. バリケシル-マンヤス平野農業開発計画

3.1 計画対象地区現況

(1) 位置および行政

本計画対象地区はトルコ西部のバリケシル県にあり、イスタンブールより南東約180 kmに位置する。地区の主要都市はマンヤスで、県庁所在地バリケシルから北方45kmにあり、イスタンブールとは国道200号線および220号線で結ばれている。また、計画対象地区は、マンヤス郡内の24カ村、ギュネン郡内の3カ村およびバンドゥルマ郡内の2カ村にまたがっており、総人口は18,800人である。

(2) 計画対象面積

計画対象面積は、バリケシル-マンヤス平野にあり、現在国家水利総局（DSI）によってコジャチャイ川上に建設中のマンヤス・ダムによって灌漑される28,000haである。

(3) 自然条件

(a) 地形

計画対象地区は、ダム・サイトから下流8km地点からマンヤス湖（自然湖）までの間でコジャチャイ川の両岸に広がっている。地区は中央部に広がる平地部（全面積の86%）と山裾部の緩い起伏を持つ台地とに大別できる。平地部の地形勾配は0.01 - 0.02%で南から北に向かって傾斜しており、台地部は2 - 10%の割合で平地に向かって傾斜している。

(b) 気候

計画対象地区はマルマラ気候帯とエーゲ海気候帯との移行部に位置し、高温で乾燥した夏と低温で雨の多い冬によって特徴付けられる。バリケシルにおける観測データによれば、流域における年平均降水量は572mmで、この約80%は11月から4月までの6ヵ月間に降る。また、年平均気温は14.5°C、年平均相対湿度は78%と観測されている。

(c) 水源

計画対象地区の灌漑水源は、現在DSIがコジャチャイ川中流部に建設中のマンヤス・ダム（貯水容量3.94億m³を有する発電と灌漑の多目的）である。なお、コジャチャイ川は1,981km²の流域を持ち、年平均総流出量は5.53億m³と観測されている。

(d) 土壌

計画対象地区における土壌は、平地部は主として沖積土壌、また、大地部は崩積土壌で覆われている。灌漑適性は、地区の86%はクラスIに含まれ、残りはクラスII～Vに含まれる。

(4) 社会基盤整備状況

(a) 交通

計画地区内における主要道路網は国道565号線で、その他にも県道が良く発達している。これらの道路は全てアスファルトで舗装されており、維持管理も良く行き届いている。一方、農村道は一部の道路を除いては無計画に造られ、また、無舗装で構造物が壊れているものが多い。

(b) 電気

流域内における電化は進んでおり、殆ど全ての家庭に電力が供給されている。

(c) 電話

流域内における電話施設は広く行き渡っており、半数以上の家庭は電話を備えている。

(d) 村落給水

計画地区内の都市部では殆ど全てに亘ってパイプ給水システムが整備されているが、農村部では井戸もしくは湧き水から直接水を取り利用している。

(e) 村落排水

9カ村における下水処理工事は完了しているが、他の村では各家庭からの下水は吸い込み方式で処理されているか、もしくは下水パイプによって集められているが、処理されずに川または窪地にそのまま捨てられているケースが大部分である。

(f) 集会施設

計画地区内の殆ど全ての市町の役場には集会場と会議室が設置されており、住民の集会の為に利用されているが、農村部においては、協同組合の事務所または喫茶場があり、通常集会等はここで開催されている。

(5) 農業の現況

現在、計画対象地区では小麦、トマト、トウガラシ、砂糖大根、トウモロコシ、ヒマワリ、豆類等が広く栽培されている。このうち、近傍に加工工場があることから、トマトおよび砂糖大根は重要な作物であり全灌漑地（全地区の20%）で栽培されている。これら農産物の生産に加えて、本地域においては畜産も主要な産業の一つである。農家は家畜を運搬や耕耘に利用するとともに畜産物による収入を得ている。主要な家畜は、牛、羊、山羊およびニワトリ等である。

本地区は農業のポテンシャルは非常に高いにも拘らず、その生産性高いとは言えない。その理由として、以下の事柄が挙げられる。

- 農地の分散化
- 若い世代の流出
- 不適切な営農
- 妥当価格より低い農産物価格

- 灌漑施設および農地整備の遅れ
- 農道および村落道路の未整備
- 水利組合設立の遅れ

3.2 開発構想

(1) 計画の目的

本計画の目的は、(i) 用排水施設を建設することにより土地の生産性を高めること、(ii) 農地整備を行うことにより作業効率および灌漑用水の配水効率を高めること、(iii) 灌漑地区に先進的営農体系を導入すること、(iv) 水管理と施設の運営・維持に有効な管理体制を確立すること、および(v) 農村インフラを整備することにより地域農民の定住促進、生活向上を計ることにある。

(2) 用排水施設の建設

DSIの責任においてマンヤス・ダムおよび幹線水路の建設は行なわれることになっていることから、本計画では2次水路以下の灌漑施設および排水施設の建設を行うこととする。

(3) 農地整備計画

農地の現況を考慮し、以下の作業を含む農地整備を行うものとする。

(a) 換地

地区における農地の分散はひどく、1農家で10カ所以上に分散して農地を保有しているケースが多々見られる。将来農作業の効率を上げる目的で換地事業が必要となろう。

(b) 区画整理

現況における区画の形状・面積等は将来想定される本格的な機械化営農作業体系からみて十分な条件を備えていないことから、将来区画整理を行う必要がある。

(c) 農道整備

農道の密度が低く道路に接していない筆も多く、また、道路の幅員が狭い上に屈曲していることから、農道の整備を行う必要がある。

(d) 用水施設の整備

未整備農地においては圃場内の配水施設が不備のため、灌漑水を必要以上に使用していることから、これら灌漑施設の整備が必要となろう。なお、節水灌漑を目指すことから、スプリンクラー、ドリップ灌漑等節水灌漑システム導入の可能性の検討も必要となろう。

(e) 排水施設の整備

未整備農地においては配水組織、施設（落水工、暗きょ排水、小排水路、排水ポンプ等）の不備の地区が多く、土地・労働生産性の向上を阻害していることから、排水施

設の完備が不可欠となろう。

(4) 先進営農体系導入計画

高収益作物の選定、稲作を中心とした作付けの多様化、肥料および農薬の適正施用、収穫後処理および流通システムの改良を含む改良農法の導入を計ると同時に、試験研究、農業普及、農業金融等を含む農業支援サービスの改善、村落開発協同組合、農業信用組合、農産物販売協同組合等の改善と指導が必要となろう。

(5) 水管理組織導入計画

小規模灌漑地区ではGDRS指導で灌漑協同組合が設立されており、また、大規模灌漑地区では現在DSIの指導で水利組合を組織中であるが、公平な水配分、施設の運営・維持管理、水利費の徴収等を更に効率良く的確に行うためには現存の組織の見直しおよび組合に対する指導が必要となろう。

(6) 農村基盤整備計画

農村基盤整備のコンポーネントとしては、上水施設、農村道路、農産物集出荷・貯蔵施設、集会所、下水処理施設、レクリエーション広場等が考えられる。計画ではこれら施設の必要性、適正規模の検討が必要となろう。

2.3 総合所見

(1) 事業の特徴と意義

- (i) 本計画地区周辺には、砂糖工場、トマト加工工場および乳製品工場があることから、これら工場への原料供給基地として、本計画の実施は意義がある。
- (ii) 世銀が1993年に作成した"Irrigation Management and Investment Review"に関するアプレイザル・レポートによれば、現在トルコが直面している灌漑分野の大きな問題点の一つとして、DSIが担当する基幹灌漑施設の建設は年間47,600haの割合で伸びているのに対して、GDRSが担当する末端施設の建設は年間39,000haと両者間のギャップは年々開いており、DSIの投資に見合う灌漑効果が上がっていないことが指摘されている。従って、このような現象を無くする意味からも、本計画はDSIが行っている基幹施設の建設と並行して実施されることは意義がある。
- (iii) 世銀は、また、上記アプレイザル・レポートの中で、国家水利総局(DSI)が管轄している灌漑施設の運営・維持管理業務の全てを受益農民に移管し、政府の財源負担を軽減するよう提案した。なお、この移管は、農民個人に対してではなく、DSI指導の下に組織される水管理組合に対して行うことが好ましいとしている。この提案に従い、トルコ政府は1993年から、DSI管轄の灌漑プロジェクトを対象に水管理組合の設立作業を開始し、1995年6月までに約70%の地区において完了した。しかしながら、このようにして設立された水管理組合は、水管理および施設の維持管理に関するマニュアルが無く、また、水管理組合に対する組織だったトレーニングも行なわれてはおらず、その活動状況は満足するものではない。このことから、本計画を通して、水管理および施設の維持管理に関するマニユ

ルを作成し、これを完成したプロジェクトに適用して実効を上げることは意義がある。

(2) 相手政府の意向

トルコ政府の当事業に対する高い優先度はGDRSの灌漑局長および担当職員との面談を通して確認できた。なお、GDRSは、本計画をマルマラ海地域のパイロット事業として取り上げたい意向を持っている。同時にGDRSは、当事業に対する日本政府の技術および資金援助を望んでおり、ADCA調査団としても当事業を日本政府の優良なODA案件として取り上げることが望ましいと判断する。

(3) 留意事項

本計画地区の北端には野鳥保護区として有名なマンヤス湖（自然湖）がある。現在DSIによって建設中のマンヤス・ダムはこの自然湖に流れ込んでいるコジャチャイ川上にあることから、この湖の自然環境には十分配慮したダムの運用計画、営農計画を立てる必要がある。

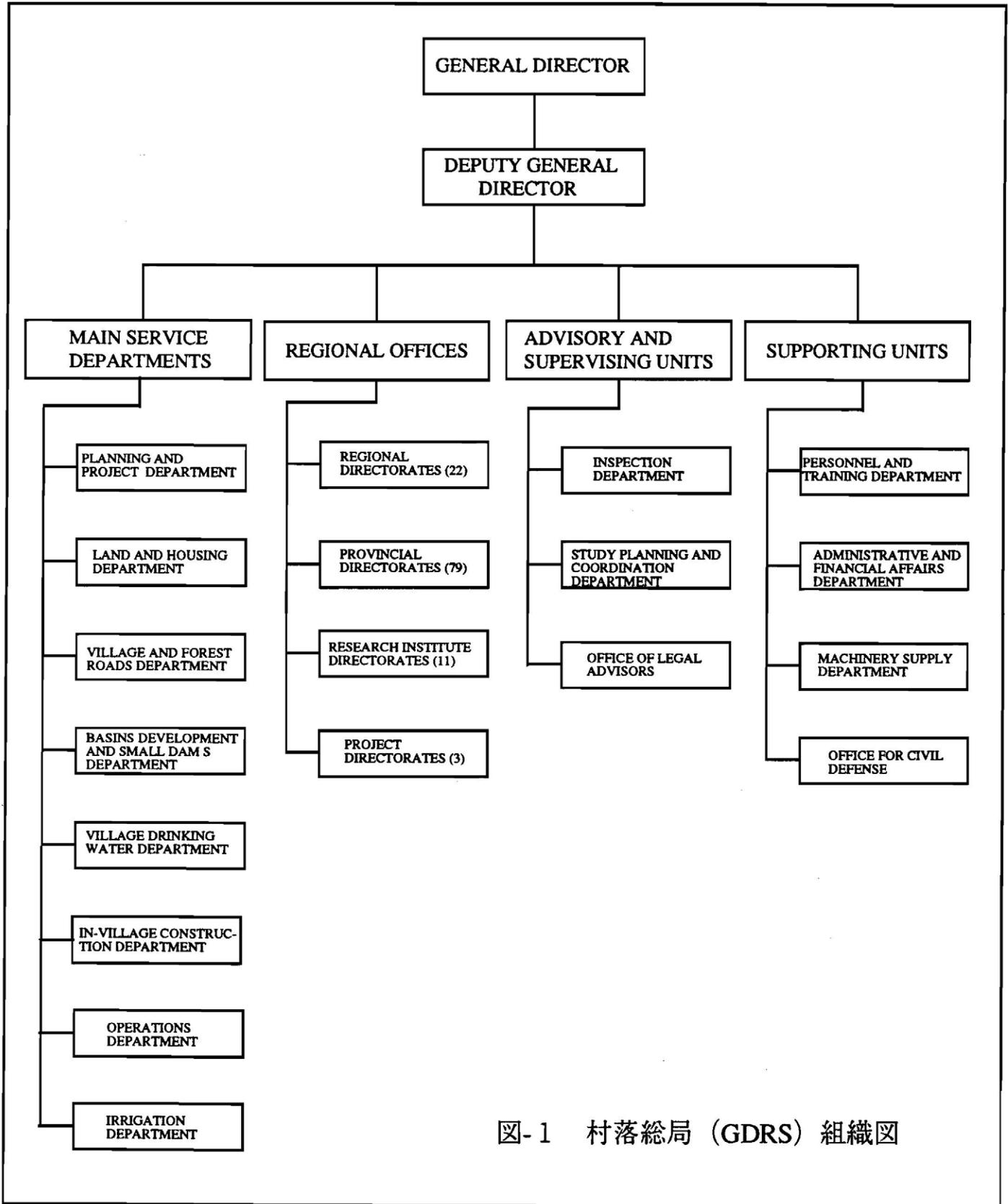


図-1 村落総局 (GDRS) 組織図

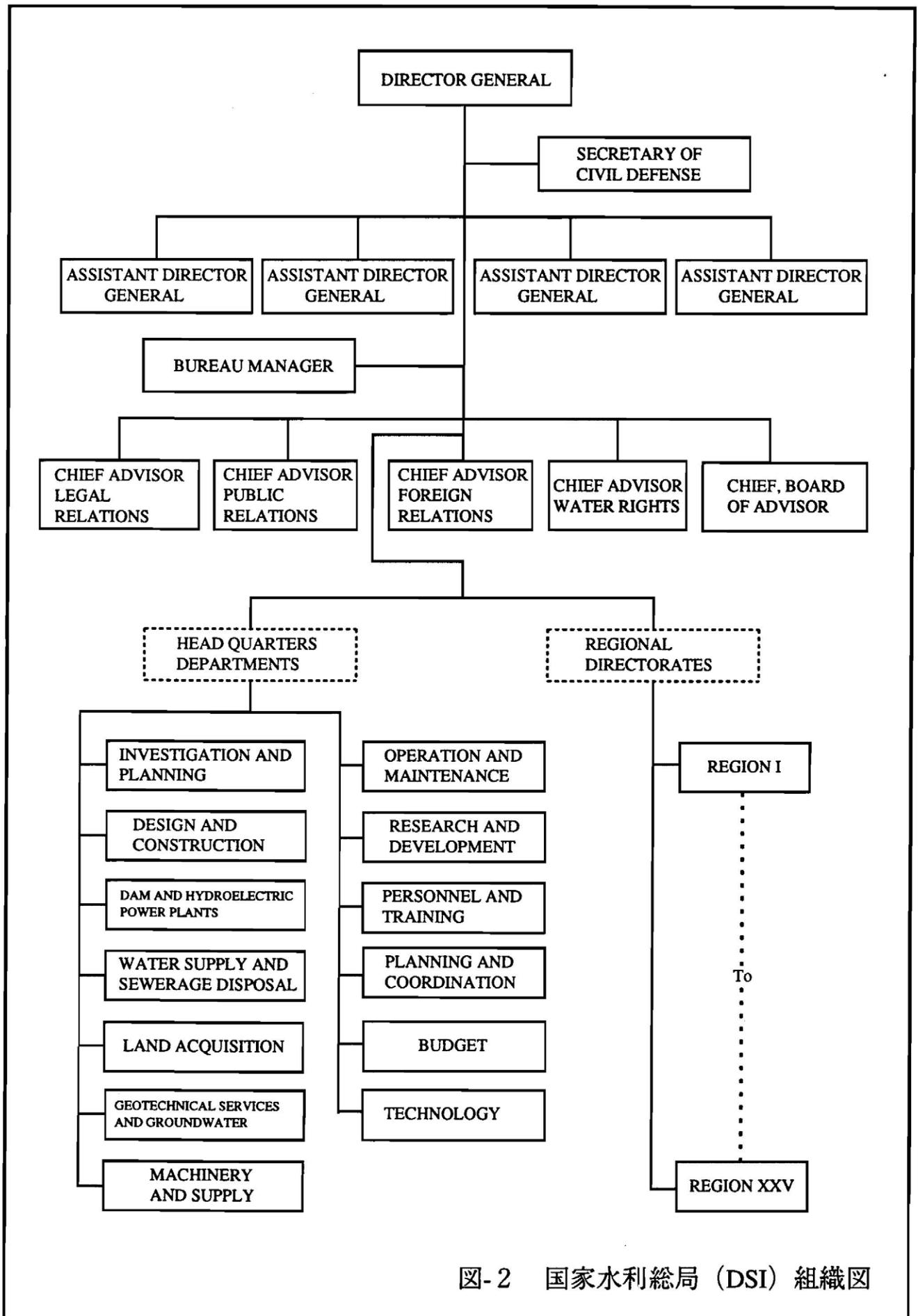


図-2 国家水利総局 (DSI) 組織図

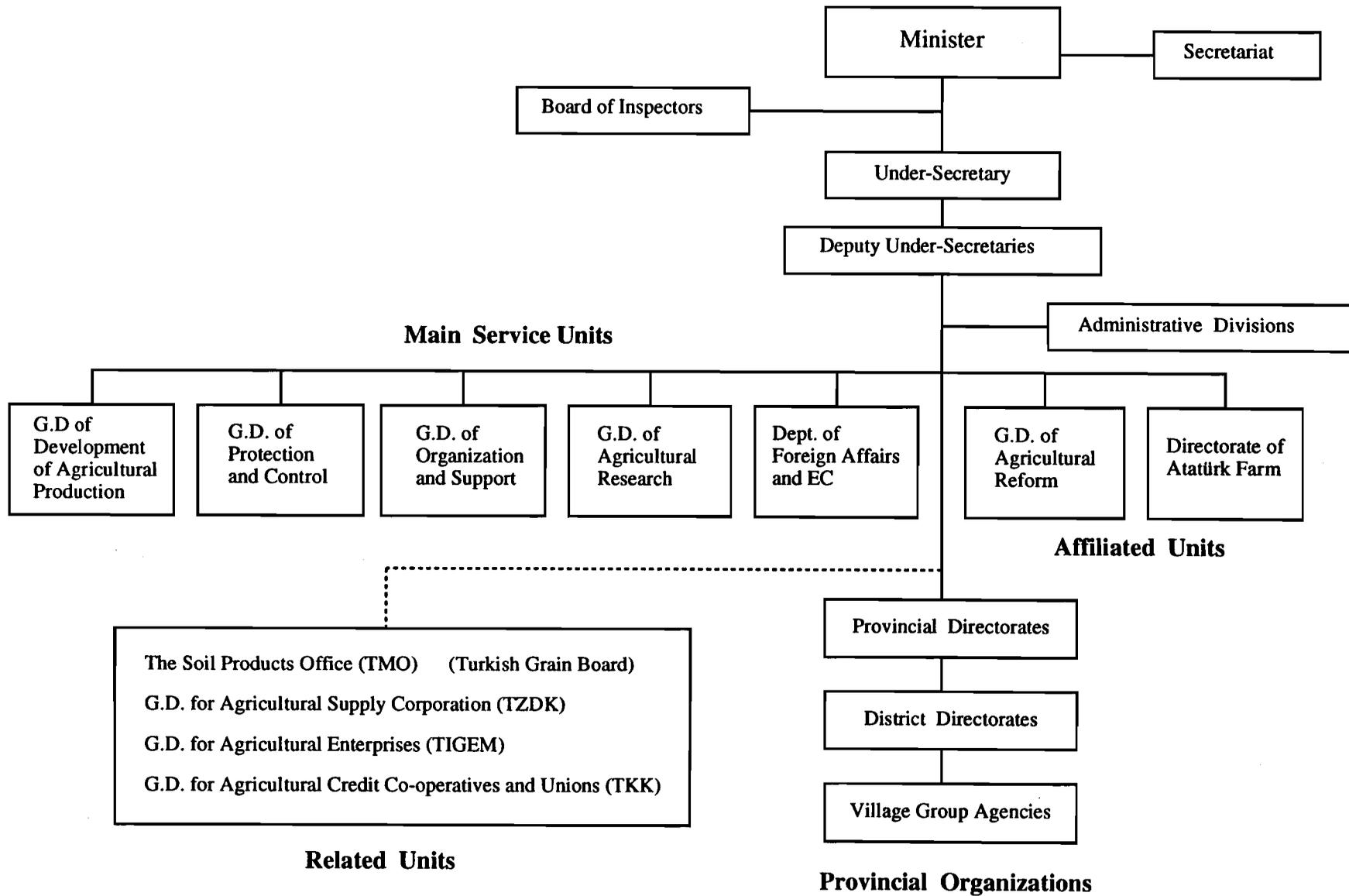


圖-3 農業村落省 (MARA) 組織圖

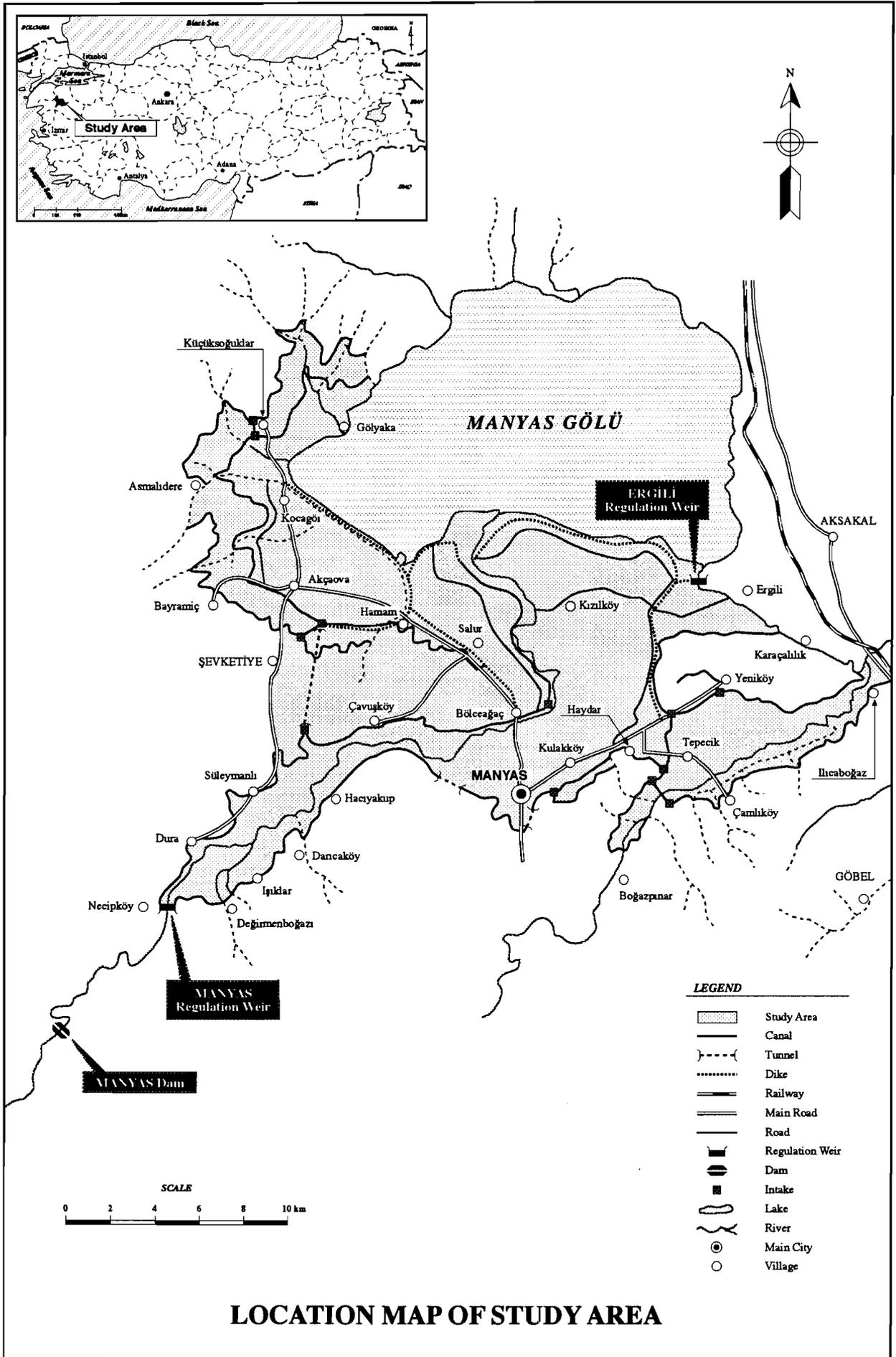


図-5 調査対象地域位置図 (バリケシル・マンヤス平野農業開発計画)

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

1. Project Digest

1.1 Project Title

Land Consolidation and Rural Development Project in the Meriç-Ergene River Basin

1.2 Location

Meriç-Ergene River Basin in Edirne Province (See Attachment - 1: Location Map)

1.3 Implementing Agency

(a) Name of Agency

General Directorate of Rural Services (GDRS) of Prime Ministry of the Republic of Turkey

(b) Organization of Agency

(See Attachment - 2: Organization Chart of General Directorate of Rural Services)

1.4 Desirable Implementation Schedule

(a) Feasibility Study: Approximately 20 months from mid 1997

(b) Implementation: Approximately 5 years from 2000

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

(1) General

Turkey occupies an area of about 779,000 km², of which about 36%, or 27.7 million ha, is classified as agricultural lands including 5.3 million ha of fallow lands. Around 9.3 million ha of land is composed of built-up areas, riverbeds, marsh areas and lakes, etc.

As of 1990, the total population of Turkey was estimated to be 56.5 million. Of the total population, 23.2 million, or 41%, lived in rural areas and the remaining 33.3 million, or 59%, in urban areas. The population density was estimated at 73 persons/km² in 1990. The population growth rates are 0.67% per annum in rural areas and 3.59% in urban areas. The high increase of population in urban areas is mainly attributed to the rural-to-urban migration.

During the period from 1981 to 1992, the gross domestic product (GDP) grew at a rate of 6.6% per annum for industry, compared to 2.7% for agriculture and 4.7% for services. Consequently, the economic position of the agriculture sector in the GDP fell from 42% in 1960 to 17% in 1992, while the shares of industry and services rose from 16% to 26% and 36% to 51% respectively in the same period.

(2) Agricultural Sector

Although agriculture has become a less significant sector in the national accounts, it is still an important sector in the national economy, because it still accounts for 14% of the total output. In addition, about 41% of the population lives in rural areas where the main economic activity is agriculture, and 44% of the total work force is in agriculture. Moreover, many manufactured exports depend on the processing of raw agricultural materials, including cotton textiles and processed food products.

The family-owned farm is the basic unit of agriculture production. Other types such as tenant farming and share-cropping are limited. According to the 1990 Agricultural Census, around 60% of farms have less than 5.0 ha of land, and the national average size of farm holdings is 5.3 ha. The degree of fragmentation in farm holding is high. Single-plot holdings account for only 15% of the total number of holdings and around 60% are highly fragmented, consisting of four or more plots.

In addition to the above farm holding system, family members provide most of the farm labor. The children under 16 years old constitute an important part of seasonal labor in agriculture. Therefore, low educational levels of farm labor become a major problem in the rural area. The agricultural sector plays an important role to absorb the labor force.

Cereals are the dominant field crops in Turkey. Next major crops by cultivated area are pulses, followed by industrial crops, oilseeds, tree crops and horticulture. The production level shows a wide regional difference between high yields in the coastal area and low yields in the central and eastern areas. The production of major cereals, i.e., wheat, barely and maize, fell to 22.7 million tons in 1989 due to the severe drought. However, the production rose again to around 30 million tons from 1990 to 1993. Cotton, sugar beet and tobacco are not only industrial crops but also the most important commercial crops. The production of sugar beet and tobacco increased under the policy of price support, while the production of cotton tended to decline in recent years. The export amount of horticultural products such as fresh vegetables and fruits has been expanding recently, reaching more than 800,000 tons, or over 10% of the total agricultural export value in 1992.

More than 90% of farmers practice mixed farming with both crop and livestock production. The most important livestock products are cow milk, sheep meat and beef. The number of cattle decreased from 70 million in 1989 to 61 million in 1993. The production of meat also decreased around 20% during the same period, while milk production increased 8.0% due to the introduction of hybrid breeds.

(3) Irrigation Sector

Water is a major limiting factor for agriculture in many parts of Turkey, and therefore the successful development and management of irrigation infrastructure is of great importance for the future development of Turkey's agriculture. According to a World Bank report (1993), the average value added per unit irrigated area is 2.6 times that of a rainfed area, because annual precipitation is less than 500 mm in 70% of the country land.

In 1993, the total area equipped with irrigation facilities implemented by the Government was estimated at 3.2 million ha, which corresponded to an annual growth rate of 3.5% since 1970. In addition to this area, about 900,000 ha of land has been provided with irrigation facilities by farmers themselves. Thus, the total area equipped with irrigation facilities amounts to 4.1 million ha, which corresponds to 14.8% of the total agricultural land of 27.7 million ha in Turkey.

2.2 Sectoral Development Policy

The agricultural policy has been implemented based on the Five-Year Development Plans. The basic objectives of the plans are: (i) to meet the nutritional needs of the growing population; (ii) to increase the crop yield and production; (iii) to reduce the vulnerability of production under adverse climatic conditions; (iv) to develop the export potential of agricultural commodities; and (v) to develop rural areas .

The rapid population growth rate requires an increasing supply of agricultural products in order to maintain self-sufficiency. In addition, the Government is eager to raise the level of animal protein consumption closer to European countries in the long term, because Turkish people still largely depend on grains, fruits and vegetables for nutrition.

As cultivated lands have reached the limits, further growth of agricultural production needs to be achieved mainly by reducing fallow land and increasing yield. The target annual growth rate of agricultural production was set at 4.2%, consisting of 3.7% for crops and 4.9% for animal husbandry, during the Sixth Five-Year Development Plan. For crop production, the Government aimed to increase crop yields by promoting greater use of hybrid seeds, pesticides, chemical fertilizers, and irrigation. For animal husbandry, expansion of fodder crops and introduction of hybrid breeds were promoted.

Irrigation is the most useful means for reducing the vulnerability of production under adverse climatic conditions. The Government has set a specific target for the expansion of the irrigation area since the First Five-Year Development Plan was adopted in 1961. The target was to expand the irrigation area to 53.4% of the total irrigable area by 1995.

The Government also set targets for exports of both raw and processed agricultural commodities. The Sixth Five-Year Development Plan aimed to increase exports of agricultural products at an annual rate of 2.8% for crops, 6.3% for livestock and livestock products, and 11.7% for processed food.

The rural development policy has aimed essentially at upgrading the economic and social infrastructure in rural areas in order to raise the living standards and to reduce the rate of migration to urban areas. The policy was also focused on the upgrading of transport and telecommunication facilities and improvement of Government services including education, health care and sanitation.

2.3 Problems to be Solved in the Sector

Major problems to be solved for the realization of proper agricultural development in the country are as mentioned below.

- (i) dispersion of land-holding,
- (ii) out-migration of younger generations,
- (iii) improper farming practices,
- (iv) lower prices than reasonable ones for agricultural products,
- (v) less development of on-farm facilities and land consolidation,
- (vi) less development of water users' associations and agricultural support system, and
- (vii) Less fund for agricultural credit

2.4 Outline of the Project

(1) Objectives of the Project

The Land Consolidation and Rural Development Project in the Meriç-Ergene River Basin has following objectives:

- (a) Short-term objectives
 - (i) to enhance credibility of irrigation system,
 - (ii) to implement on-farm development including farm land consolidation,
 - (ii) to enhance agricultural production and productivity,
 - (iii) to introduce advanced farming techniques and agricultural support system, and
 - (iv) to implement rural development
- (b) Long-term objectives
 - (i) to ensure a sufficient and balanced nutrition for the increasing population,
 - (ii) to prevent the out-migration from the rural areas to urban areas,
 - (iii) to maintain a balance between agricultural development and the environment.

(2) Project Components

In order to attain the above objectives, the following works need to be implemented in 22,000 ha under the Project:

- (i) rehabilitation of existing irrigation system and construction of drainage system,
- (ii) on-farm development including land consolidation, land leveling, construction of tertiary canals, field ditches, tertiary drains, field drains and farm roads,
- (iii) introduction of improved farming practices including the selection of profitable crops and diversified cropping system, proper and timely application of fertilizers and chemicals, and improvement of post-harvesting and marketing system,
- (iv) improvement of agricultural support services such as agricultural research, agricultural extension services and agricultural credit, and improvement of farmers' organizations such as village development cooperatives, agricultural credit cooperatives and agricultural marketing cooperatives,
- (v) establishment of an effective water management and O&M system, including the establishment of water users' associations,
- (vi) construction of domestic water supply system, sewage facilities, roads, play grounds and halls in village areas and others, if required.

(3) Prospective Beneficiaries

Around 110,000 people in 60 villages in the Meriç-Ergene river basin

(4) Priority of Project in National Development Plan

Edirne province, in which the Project area exists, is the largest rice granary in Turkey having 55,000 ha of paddy fields (39% of the total paddy fields of the country), and producing 140,000 tons of paddy (38% of the total production of the country). While, the demand had been increasing at the yearly rate of 4.6% in the past 5 years and reached 420,000 tons in 1993, and the Government spent US\$ 85.0 million to import the shortage of 280,000 tons. Under such circumstance, the Government has a plan to increase the rice production, and intends to take up the Project with the highest priority. The Government is also expecting that the Project would be the model scheme for the other rice producing regions.

3. Terms of Reference of the Proposed Study

(Refer to Attachment -3)

4. Facilities and Information for the Study Team

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

The implementing agency of GDRS 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
- Cadastral maps on a scale of 1 : 50,000
- 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 as well as in the capital city of Ankara.

5. Global Issues

(1) Environmental Components

It is proposed to conduct an environmental study in the course of the Study in accordance with the instruction of the Ministry of Environment.

(2) Anticipated Environmental Impacts by the Project

Negative impacts are predicted on the downstream swamp and water quality from the agricultural development, in which intensive use of agro-chemicals would be practiced. Although it is considered that the predicted negative impacts would be minimum, because only a limited area would be developed in the river basin, it is necessary to assess an environmental impacts of the Project in the 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 land consolidation is planned to be implemented under the Project. Accordingly the women's participation in the farming activities would be reduced after completion of the Project. In addition to this anticipated impact, it is pointed out that women's work for obtaining drinking water would be reduced, because water supply system is planned to be installed in village areas under 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. Undertakings of the Government of Turkey

In order to facilitate a smooth and efficient conduct of the Study, the Government of Turkey 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 Turkey 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.

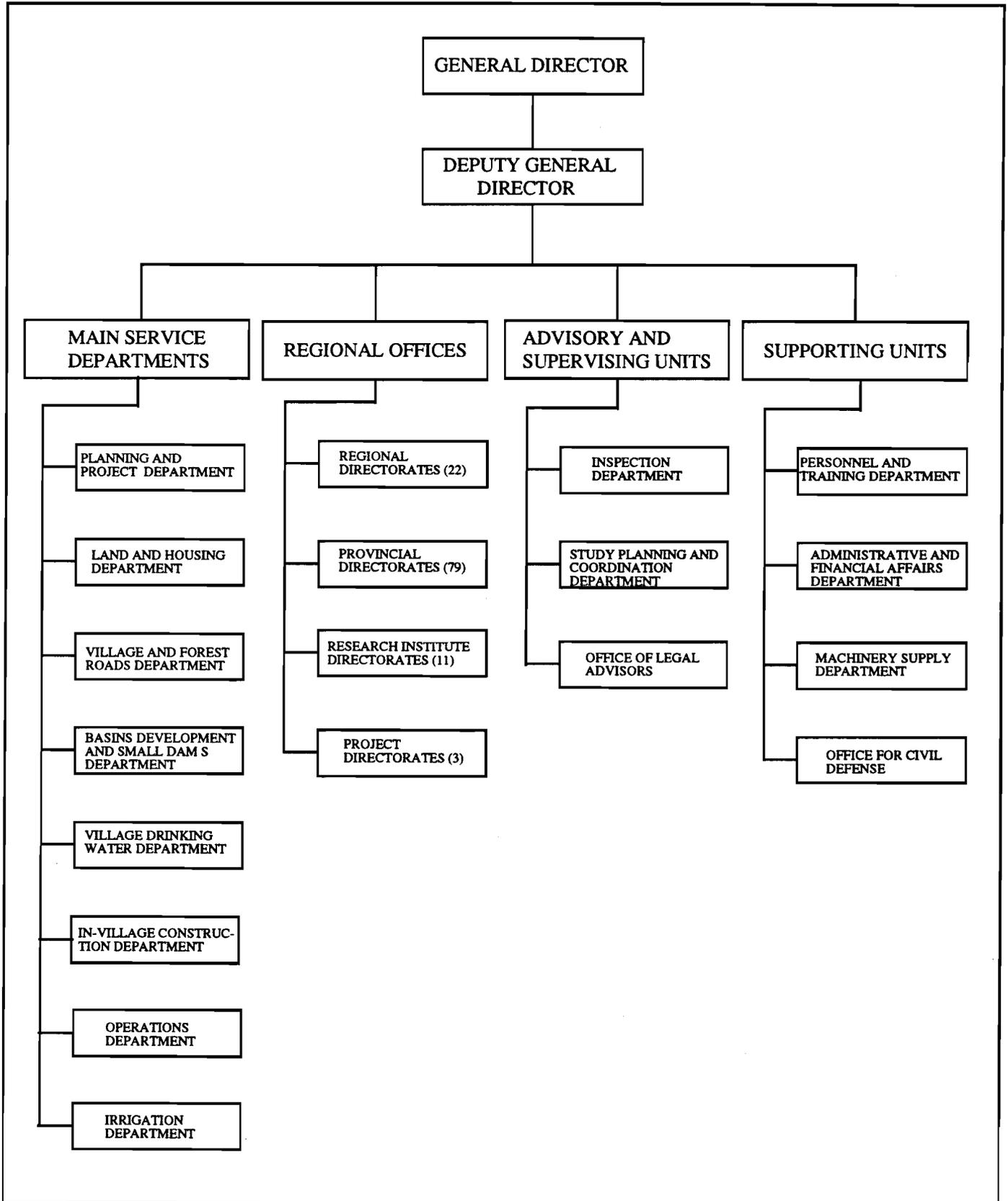
The Government of Turkey assured that the matters referred in this form will be ensured for a smooth conduct of the Development Study by the Japanese Study Team.

Signed:

Titled:

On behalf of the Government of the Republic of Turkey

Date:



Organization Chart of General Directorate of Rural Services

**Terms of Reference
for
The Feasibility Study
on
The Land Consolidation and Rural Development Project
in
The Meriç-Ergene River Basin**

1. Background and Justification of the Study

Edirne province, in which the Project area exists, is the largest rice granary in Turkey having 55,000 ha of paddy fields (39% of the total paddy fields in Turkey), and producing 140,000 tons of paddy (38% of the total production of the country). However, its productivity is very low showing 2.55 tons per hectare. This is mainly due to: (i) improper farming practices; (ii) dispersed type of land-holding; (iii) under-development of on-farm facilities. Understanding this inferior conditions in the area, the Ministry of Agriculture and Rural Affairs (MARA) is paying its effort to strengthening of agricultural support system such as extension work and agricultural research. While, GDRS intends to implement the land consolidation work and on-farm development work, and actually has completed these works in 2,400 ha in 5 villages in the Meriç river basin, though this implementation is still on a trial basis. At present, the implementation of these works is being implemented in about 3,200 ha in the Meriç-Ergene river basin.

GDRS has a plan to complete the land consolidation work and on-farm development work in the remaining 22,000 ha of irrigated lands and the rural development in 59 villages in the Meriç-Ergene river basin. Since this implementation plan covers a wide area and many components of implementation, it is necessary to make a master plan and feasibility study, and the implementation work should be carried out in an effective and practical way following the result of these studies.

2. Justification of Japanese Technical Cooperation

Japan is known as one of the most advanced countries in the rice culture as well as water management. If the master plan and the feasibility study are conducted under the Japanese technical cooperation, these advance technologies will be introduced to Turkey through the studies.

3. Objectives of the Study

The objectives of the Study are to formulate a strategic and comprehensive development master plan with a main emphasis on the farm land consolidation and rural development and to carry out a feasibility study on selected typical and priority projects for balanced and systematic development.

4. Study Area

Irrigated area of about 22,000 ha which is dispersedly located in the areas of about 120,000 ha along the Meriç and Ergene rivers included in Edirne province.

5. Scope of the Study

5.1 General

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

- (a) Master plan study for the above mentioned Study Area.
- (b) Feasibility study for priority irrigation project in the order of 10,000 ha.

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

Phase-I: Master Plan Study

Field Work-I: Data collection, field survey and investigation and formulation of basic development plan.

Home Work-I: Analysis, study and preparation of Master Plan Report (Interim Report)

Phase-II: Feasibility Study

Field Work-II: Topo-survey, supplementary data collection, field survey and investigations mainly for the priority project area.

Home Work-II: Analysis, study and preparation of Feasibility Report (Draft Final Report and Final Report)

5.2 Detailed Scope of the Study

Phase-I: Master Plan Study

Field Work-I

- (a) Data collection and review on:
 - (i) natural resources including topography, meteorology, hydrology, geohydrology and soil,
 - (ii) socio-economy including population and number of households, cadastral map, social structure and social infrastructure, income, living standards, national and regional development plan, 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 input, 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 road, domestic water supply system, electric supply system, telecommunication system, sewage system, post-harvest and storage facilities, community center, agro-processing facilities, school and health center,
 - (vii) farmers' organization and agricultural supporting system including irrigation cooperative, water users' association, agricultural cooperative, agricultural research, 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 at each existing dam site,
 - (ii) geohydrological survey including review of existing geohydrological study, confirmation of existing well location, survey on present well condition and check of water quality,
 - (iii) soil and land use survey including reconnaissance and auger boring to confirm the information shown in the existing soil map and field check of present land use using the existing aerial photo and topographic map,
 - (iv) irrigation and drainage survey including survey on present irrigation and drainage networks and on-farm facilities, operation and maintenance condition, activities of irrigation cooperatives and water users' associations, 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, and survey on dispersed condition of land holding based on the existing cadastral map,
 - (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 farmers' desire and intention to agricultural development, and survey on present conditions and constraints of the agricultural supporting services,
 - (vii) rural infrastructural 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 facility, community center, agro-processing facility, school and health center, 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 condition of water pollution, ecosystem, soil erosion, 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 future agricultural development.
- (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 requirements and water supply,
 - (ii) 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,
 - (iii) irrigation development plan including rehabilitation program of existing irrigation and drainage systems, on-farm development consisting of land consolidation, land leveling, construction of tertiary and quaternary canals, tertiary and quaternary drains and farm roads, and effective water management and O&M system,
 - (iv) rural infrastructural development plan including construction of domestic water supply system, sewage facility, road, play ground and hall and others, if required, in each village,
 - (v) environmental conservation plan including flood and sediment control, soil conservation, conservation of wild life, mitigation of water pollution,
 - (vi) estimate of project implementation cost,
 - (vii) project evaluation from technical and economical viewpoints and selection of priority projects, and
 - (viii) 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: Feasibility Study

Field Work-II

- (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 to be rehabilitated and drains to be newly constructed and at several on-farm development areas selected for typical design,
 - (ii) construction material survey for embankment materials, sand and gravels,
 - (iii) agricultural and agro-economic survey for the following items:
 - crops variety, cropping pattern and live stock,
 - crop production and seed marketing system,
 - trend of demand and supply of agricultural products,
 - farming practice and mechanization,
 - incremental effect on yield by irrigation,
 - labor balance on farming practices,
 - profitability and marketability of crops,
 - agro-processing and post-harvest,
 - marketing, transportation and storing, and
 - institutional constraints to the project development,
 - (iv) survey on agricultural support system for the following items:
 - agricultural support system to introduce new crops and irrigation methods including demonstration or experimental farm,
 - research station, extension and credit,
 - government policy for agricultural development,
 - present activities and financial situation of organizations and institutions for the agricultural support system, and
 - constraints to the agricultural development,
 - (v) survey on rural infrastructure particularly for domestic water supply system, sewage facility, village-link road, play ground, village hall and others, if require,
 - (vi) cost survey for construction materials, construction equipment and laborers, and

- (vii) 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-II

- (a) Formulation of development consisting of:
 - (i) agricultural development plan including recommendable crops and cropping pattern, modernized farming practices, expected farm income after implementation of the Project, and improved marketing system, agricultural support system and farmers' organizations,
 - (ii) irrigation development plan including the calculation of water requirement and drainage module, preliminary design for rehabilitation of existing irrigation system and new drainage system, typical design for on-farm development works selecting several areas, and preparation of water management and O&M manual,
 - (iii) rural infrastructural development plan including the layout plan and typical design of domestic water supply system, sewage facility, road, play ground and hall and others, if required, in a 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 and financial 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 investigation for every lines of 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 20 months in total for two phases as follows (See Figure 1):

Phase-I Study:	9 months
Phase-II Study:	11 months

The following foreign experts will be required for the Study:

- Team Leader/O&M Expert
- Irrigation /Drainage Engineer
- Agronomist
- Agro-economist
- Socio-economist
- Rural Development Expert
- Hydrologist
- Pedologist
- Geohydrologist
- Soil Mechanical Engineer
- Topographic Engineer
- Design/Cost Estimate Engineer
- Environmentalist

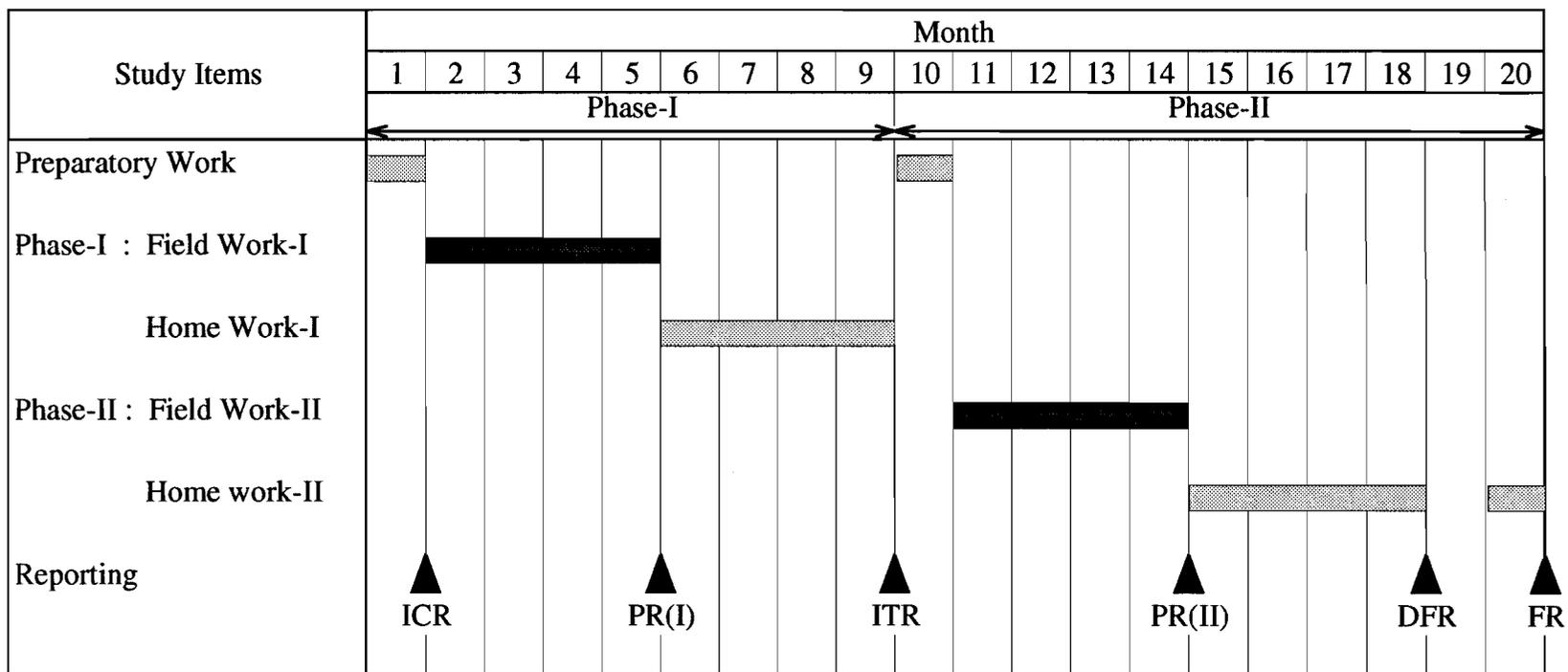
The required manpower input is estimated to be 90 man-months in total.

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 total study area with the priority order of agricultural development for respective projects included in the study area, and (ii) project evaluation from the technical and economical viewpoints and the implementation program for the priority project. These study results will be compiled in the following reports which will be submitted to the Government of Turkey.

Inception Report	:	within one month after start of the Phase-I Study
Progress Report (1)	:	at the end of the Field Work-I 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-II of the Phase-II Study
Draft Final Report	:	at the end of the Phase-II Study
Final Report	:	within one month after getting GDRS's comments on the Draft Final Report

Figure 1 Tentative Work Schedule



Note: Work in Turkey
 Work in Japan

ICR : Inception Report
 PR(I) : Progress Report (I)
 ITR : Interim Report
 PR(II) : Progress Report (II)
 DFR : Draft Final Report (Master Plan Report)
 FR : Final Report(Feasibility Report)

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

1. Project Digest

1.1 Project Title

Land Consolidation and Rural Development Project in the Balikesir-Manyas Plain

1.2 Location

Balikesir-Manyas Plain in Balikesir Province (See Attachment - 1: Location Map)

1.3 Implementing Agency

(a) Name of Agency

General Directorate of Rural Services (GDRS) of Prime Ministry of the Republic of Turkey

(b) Organization of Agency

(See Attachment - 2: Organization Chart of General Directorate of Rural Services)

1.4 Desirable Implementation Schedule

(a) Feasibility Study: Approximately 1.5 years from mid 1997

(b) Implementation: Approximately 5 years from 2000

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

(1) General

Turkey occupies an area of about 779,000 km², of which about 36%, or 27.7 million ha, is classified as agricultural lands including 5.3 million ha of fallow lands. Around 9.3 million ha of land is composed of built-up areas, riverbeds, marsh areas and lakes, etc.

As of 1990, the total population of Turkey was estimated to be 56.5 million. Of the total population, 23.2 million, or 41%, lived in rural areas and the remaining 33.3 million, or 59%, in urban areas. The population density was estimated at 73 persons/km² in 1990. The population growth rates are 0.67% per annum in rural areas and 3.59% in urban areas. The high increase of population in urban areas is mainly attributed to the rural-to-urban migration.

During the period from 1981 to 1992, the gross domestic product (GDP) grew at a rate of 6.6% per annum for industry, compared to 2.7% for agriculture and 4.7% for services. Consequently, the economic position of the agriculture sector in the GDP fell from 42% in 1960 to 17% in 1992, while the shares of industry and services rose from 16% to 26% and 36% to 51% respectively in the same period.

(2) Agricultural Sector

Although agriculture has become a less significant sector in the national accounts, it is still an important sector in the national economy, because it still accounts for 14% of the total output. In addition, about 41% of the population lives in rural areas where the main economic activity is agriculture, and 44% of the total work force is in agriculture. Moreover, many manufactured exports depend on the processing of raw agricultural materials, including cotton textiles and processed food products.

The family-owned farm is the basic unit of agriculture production. Other types such as tenant farming and share-cropping are limited. According to the 1990 Agricultural Census, around 60% of farms have less than 5.0 ha of land, and the national average size of farm holdings is 5.3 ha. The degree of fragmentation in farm holding is high. Single-plot holdings account for only 15% of the total number of holdings and around 60% are highly fragmented, consisting of four or more plots.

In addition to the above farm holding system, family members provide most of the farm labor. The children under 16 years old constitute an important part of seasonal labor in agriculture. Therefore, low educational levels of farm labor become a major problem in the rural area. The agricultural sector plays an important role to absorb the labor force.

Cereals are the dominant field crops in Turkey. Next major crops by cultivated area are pulses, followed by industrial crops, oilseeds, tree crops and horticulture. The production level shows a wide regional difference between high yields in the coastal area and low yields in the central and eastern areas. The production of major cereals, i.e., wheat, barely and maize, fell to 22.7 million tons in 1989 due to the severe drought. However, the production rose again to around 30 million tons from 1990 to 1993. Cotton, sugar beet and tobacco are not only industrial crops but also the most important commercial crops. The production of sugar beet and tobacco increased under the policy of price support, while the production of cotton tended to decline in recent years. The export amount of horticultural products such as fresh vegetables and fruits has been expanding recently, reaching more than 800,000 tons, or over 10% of the total agricultural export value in 1992.

More than 90% of farmers practice mixed farming with both crop and livestock production. The most important livestock products are cow milk, sheep meat and beef. The number of cattle decreased from 70 million in 1989 to 61 million in 1993. The production of meat also decreased around 20% during the same period, while milk production increased 8.0% due to the introduction of hybrid breeds.

(3) Irrigation Sector

Water is a major limiting factor for agriculture in many parts of Turkey, and therefore the successful development and management of irrigation infrastructure is of great importance for the future development of Turkey's agriculture. According to a World Bank report (1993), the average value added per unit irrigated area is 2.6 times that of a rainfed area, because annual precipitation is less than 500 mm in 70% of the country land.

In 1993, the total area equipped with irrigation facilities implemented by the Government was estimated at 3.2 million ha, which corresponded to an annual growth rate of 3.5% since 1970. In addition to this area, about 900,000 ha of land has been provided with irrigation facilities by farmers themselves. Thus, the total area equipped with irrigation facilities amounts to 4.1 million ha, which corresponds to 14.8% of the total agricultural land of 27.7 million ha in Turkey.

2.2 Sectoral Development Policy

The agricultural policy has been implemented based on the Five-Year Development Plans. The basic objectives of the plans are: (i) to meet the nutritional needs of the growing population; (ii) to increase the crop yield and production; (iii) to reduce the vulnerability of production under adverse climatic conditions; (iv) to develop the export potential of agricultural commodities; and (v) to develop rural areas .

The rapid population growth rate requires an increasing supply of agricultural products in order to maintain self-sufficiency. In addition, the Government is eager to raise the level of animal protein consumption closer to European countries in the long term, because Turkish people still largely depend on grains, fruits and vegetables for nutrition.

As cultivated lands have reached the limits, further growth of agricultural production needs to be achieved mainly by reducing fallow land and increasing yield. The target annual growth rate of agricultural production was set at 4.2%, consisting of 3.7% for crops and 4.9% for animal husbandry, during the Sixth Five-Year Development Plan. For crop production, the Government aimed to increase crop yields by promoting greater use of hybrid seeds, pesticides, chemical fertilizers, and irrigation. For animal husbandry, expansion of fodder crops and introduction of hybrid breeds were promoted.

Irrigation is the most useful means for reducing the vulnerability of production under adverse climatic conditions. The Government has set a specific target for the expansion of the irrigation area since the First Five-Year Development Plan was adopted in 1961. The target was to expand the irrigation area to 53.4% of the total irrigable area by 1995.

The Government also set targets for exports of both raw and processed agricultural commodities. The Sixth Five-Year Development Plan aimed to increase exports of agricultural products at an annual rate of 2.8% for crops, 6.3% for livestock and livestock products, and 11.7% for processed food.

The rural development policy has aimed essentially at upgrading the economic and social infrastructure in rural areas in order to raise the living standards and to reduce the rate of migration to urban areas. The policy was also focused on the upgrading of transport and telecommunication facilities and improvement of Government services including education, health care and sanitation.

2.3 Problems to be Solved in the Sector

Major problems to be solved for the realization of proper agricultural development in the country are as mentioned below.

- (i) dispersion of land-holding,
- (ii) out-migration of younger generations,
- (iii) improper farming practices,
- (iv) lower prices than reasonable ones for agricultural products,
- (v) less development of on-farm facilities and land consolidation,
- (vi) less development of water users' associations and agricultural support system, and
- (vii) Less fund for agricultural credit

2.4 Outline of the Project

(1) Objectives of the Project

The Land Consolidation and Rural Development Project in the Balikesir-Manyas Plain has following objectives:

- (a) Short-term objectives
 - (i) to enhance credibility of irrigation system,
 - (ii) to implement on-farm development including farm land consolidation,
 - (ii) to enhance agricultural production and productivity,
 - (iii) to introduce advanced farming techniques and agricultural support system, and
 - (iv) to implement rural development
- (b) Long-term objectives
 - (i) to ensure a sufficient and balanced nutrition for the increasing population,
 - (ii) to prevent the out-migration from the rural areas to urban areas,
 - (iii) to maintain a balance between agricultural development and the environment.

(2) Project Components

In order to attain the above objectives, the following works need to be implemented in 28,000 ha under the Project:

- (i) construction of secondary irrigation system and drainage system,
- (ii) on-farm development including land consolidation, land leveling, construction of tertiary canals, distribution ditches, tertiary drains, field drains and farm roads,
- (iii) introduction of improved farming practices including the selection of profitable crops and diversified cropping system, proper and timely application of fertilizers and chemicals, and improvement of post-harvesting and marketing system,
- (iv) improvement of agricultural support services such as agricultural research, agricultural extension services and agricultural credit, and improvement of farmers' organizations such as village development cooperatives, agricultural credit cooperatives and agricultural marketing cooperatives,
- (v) establishment of an effective water management and O&M system, including the establishment of water users' associations,
- (vi) construction of water supply system, sewage facilities, roads, play grounds and halls in village areas and others, if required.

(3) Prospective Beneficiaries

Around 18,800 people in 29 villages in the Balikesir-Manyas Plain

(4) Priority of Project in National Development Plan

As mentioned previously, the Government has put one of major emphases on the development of export potential of agricultural commodities in its development policy. Since there are tomato paste factories, dairy factories and a sugar factory in and around the plain, the Government intends to implement the Project as supply base of materials for these factories. In addition, the Project area is located close to Istanbul, which is the largest food consuming center in the country, and would play an important role as a food supplying base for this city.

3. Terms of Reference of the Proposed Study

(Refer to Attachment - 3)

4. Facilities and Information for the Study Team

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

The implementing agency of GDRS 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
- Cadastral maps on a scale of 1 : 50,000

- 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 as well as in the capital city of Ankara.

5. Global Issues

(1) Environmental Components

It is proposed to conduct an environmental study in the course of the Study in accordance with the instruction of the Ministry of Environment.

(2) Anticipated Environmental Impacts by the Project

Negative impacts are predicted on the Lake Manyas, which is the natural lake and famous as the birds sanctuary (so called "birds heaven"), and water quality from the agricultural development, in which intensive use of agro-chemicals would be practiced. Although it is considered that the predicted negative impacts would be minimum, it is necessary to assess an environmental impacts of the Project in the 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 land consolidation is planned to be implemented under the Project. Accordingly the women's participation in the farming activities would be reduced after completion of the Project. In addition to this anticipated impact, it is pointed out that women's work for obtaining drinking water would be reduced, because water supply system is planned to be installed in village areas under 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. Undertakings of the Government of Turkey

In order to facilitate a smooth and efficient conduct of the Study, the Government of Turkey 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 Turkey 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.

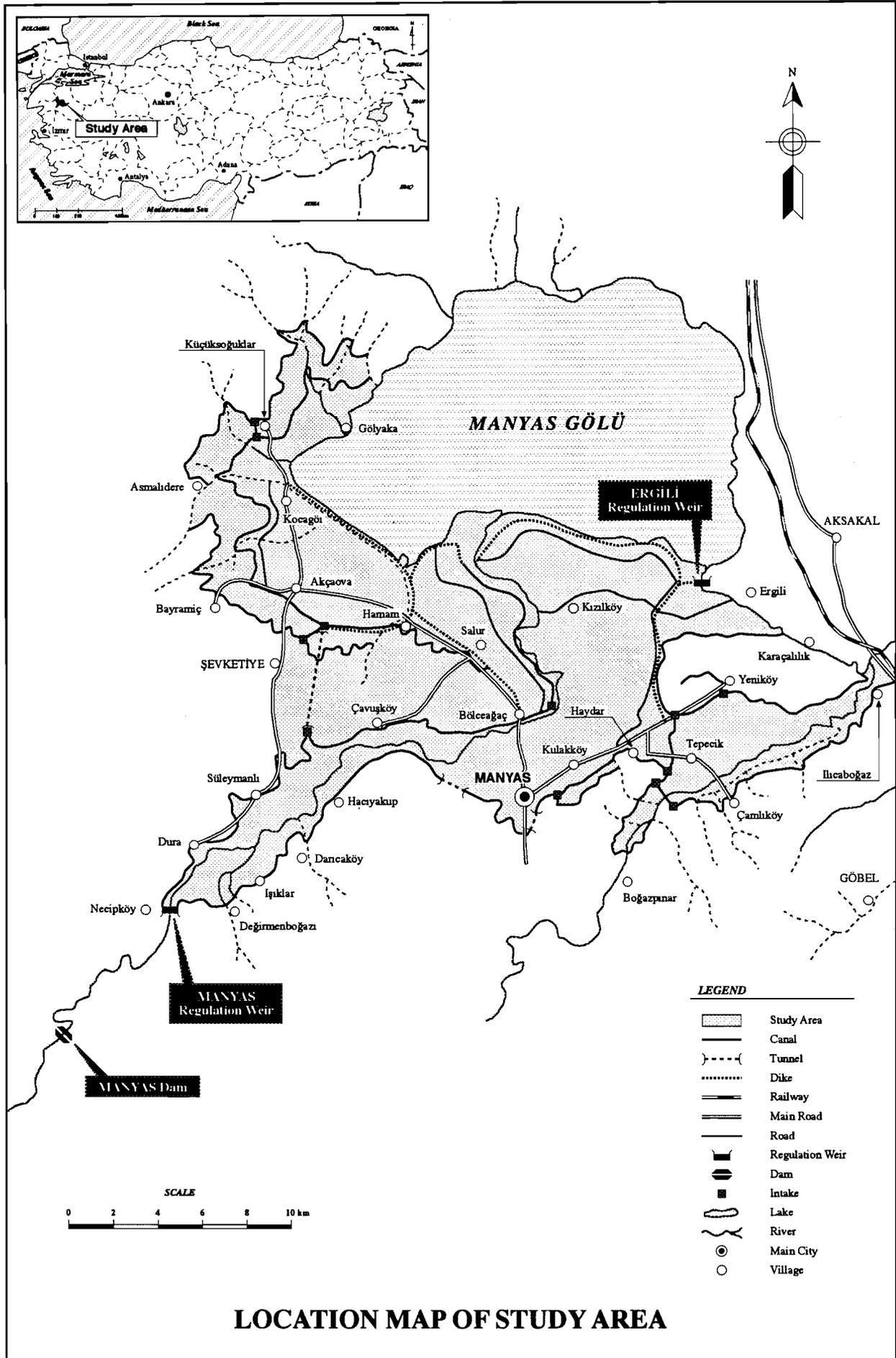
The Government of Turkey assured that the matters referred in this form will be ensured for a smooth conduct of the Development Study by the Japanese Study Team.

Signed:

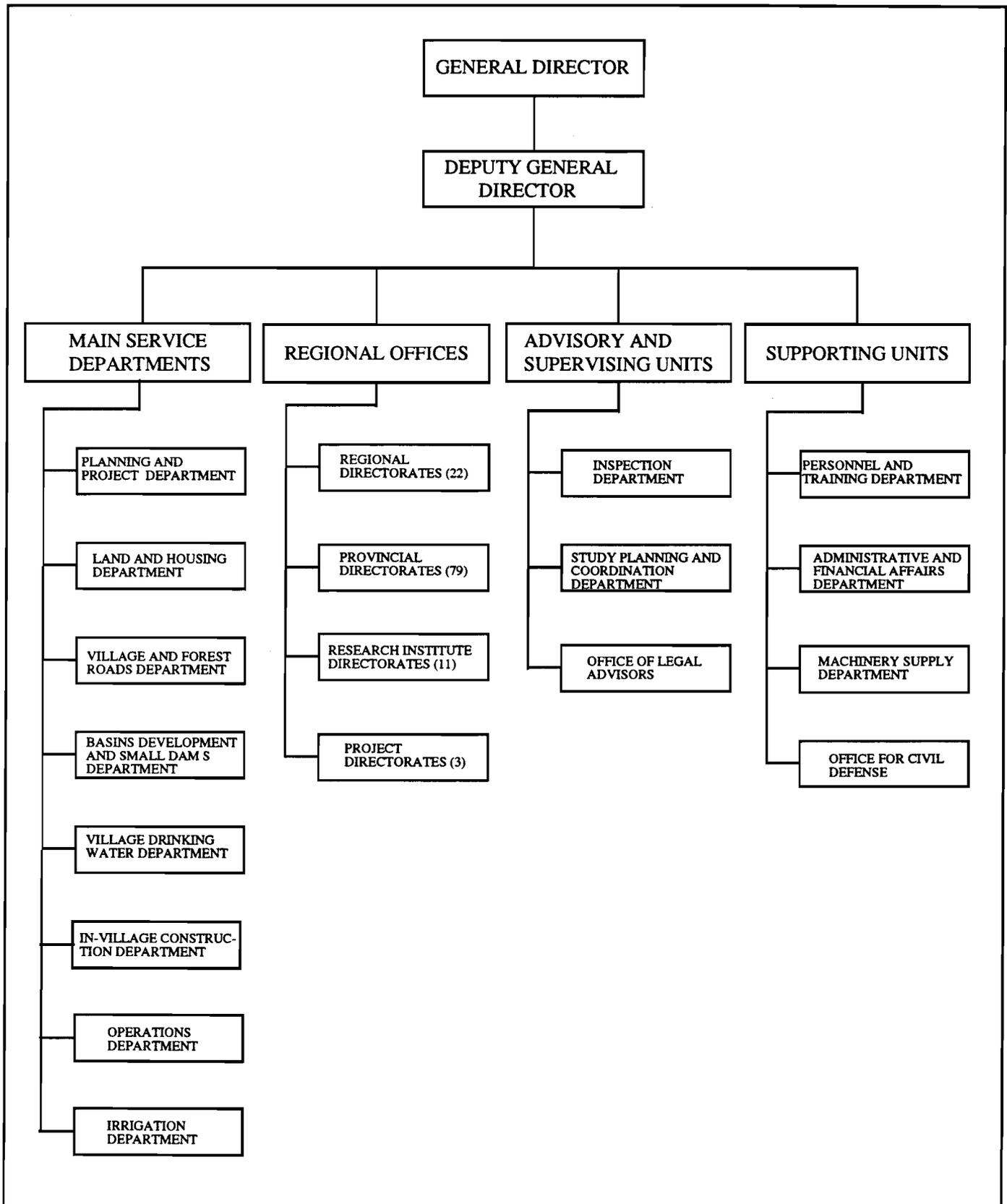
Titled:

On behalf of the Government of the Republic of Turkey

Date:



LOCATION MAP OF STUDY AREA



Organization Chart of General Directorate of Rural Services

**Terms of Reference
for
The Feasibility Study
on
The Land Consolidation and Rural Development Project
in
The Balikesir-Manyas Plain**

1. Background and Justification of the Study

The General Directorate of State Hydraulic Works (DSI) is constructing an earthfill dam with a height of 74.0 m on the Kocacay river at its debouching point to the Balikesir-Manyas Plain. The dam having its reservoir capacity of 394 MCM will be used for the purpose of hydropower generation of 19.5 MW and irrigation of 28,000 ha in the Plain. The dam construction is scheduled to be completed in the year of 2000. DSI will also construct a diversion weir on the Kocacay river, at the 8-km downstream of the dam, three pump stations, a main irrigation system of 138 km and main drainage system of 180 km.

In the above-mentioned irrigation area, GDRS has a plan to complete the construction of secondary irrigation and drainage systems, the land consolidation work and on-farm development work in the Project area of 28,000 ha, of which about 20% is being irrigated by the water pumped from wells and local creeks, and the rural development in 29 villages in the Balikesir-Manyas Plain. Since this implementation plan covers a wide area and many components of implementation, it is necessary to make an elaborate plan for agricultural and rural development for whole area and feasibility study, and the implementation work should be carried out in an effective and practical way following the result of these studies.

2. Justification of Japanese Technical Cooperation

As mentioned above, the Government of Turkey intends to develop the Balikesir-Manyas Plain as a production base of industrial crops and food supply base to Istanbul along the lines of the national development policy, and has started the water resources development for irrigation. For further investment for the construction of irrigation facilities and on-farm development, however, the Government is in difficulty in arranging its fund due to shortage of national budget and expecting the Japanese technical and financial cooperation.

3. Objectives of the Study

The objectives of the Study are to formulate a strategic and comprehensive development plan with a main emphasis on the farm land consolidation and rural development and to carry out a feasibility study dealing with the whole project area for balanced and systematic development.

2. Study Area

About 28,000 ha of farm lands included in the Balikesir-Manyas Plain, which will be irrigated by the water diverted from the Kocacay river through the construction of Manyas Dam being constructed by DSI.

5. Scope of the Study

5.1 General

The scope of the proposed study will be as follows:

- (a) Formulation of strategic and comprehensive development plan in the Study area.
- (b) Feasibility study on the land consolidation and rural development in the Study area.

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

Phase-I: Formulation of strategic and comprehensive development plan

Field Work-I: Data collection, field survey and investigation.

Home Work-I: Analysis, study and preparation of Interim Report.

Phase-II: Feasibility Study

Field Work-II: Topo-survey, supplementary data collection, field survey and investigations mainly for the priority project areas.

Home Work-II: Analysis, study and preparation of Feasibility Report (Draft Final Report and Final Report).

5.2 Detailed Scope of the Study

Phase-I: Formulation of strategic and comprehensive development plan

Field Work-I

- (a) Data collection and review on:
 - (i) natural resources including topography, meteorology, hydrology, geohydrology and soil,
 - (ii) socio-economy including population and number of households, cadastral map, social structure and social infrastructure, income, living standards, national and regional development plan, 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 input, 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 road, domestic water supply system, electric supply system, telecommunication system, sewage system, post-harvest and storage facilities, community center, agro-processing facilities, school and health center,
 - (vii) farmers' organization and agricultural supporting system including irrigation cooperative, water users' association, agricultural cooperative, agricultural research, 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) review of the "Manyas Dam Planning Report" prepared by DSI and other relevant studies,
 - (ii) hydrological survey including review of existing hydrological study and water balance study at the Manyas dam site,
 - (iii) geohydrological survey including review of existing geohydrological study, confirmation of existing well location, survey on present well condition and check of water quality,
 - (iv) soil and land use survey including reconnaissance and auger boring to confirm the information shown in the existing soil map and field check of present land use using the existing aerial photo and topographic map,
 - (v) irrigation and drainage survey including survey on present irrigation and drainage networks and on-farm facilities, operation and maintenance condition, activities of irrigation cooperatives, and water charge collection,
 - (vi) 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, and survey on dispersed condition of land holding based on the existing cadastral map,
 - (vii) 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 farmers' desire and intention to agricultural development, and survey on present conditions and constraints of the agricultural supporting services,
 - (viii) rural infrastructural 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 facility, community center, agro-processing facility, school and health center, and interview to villagers to hear their desire and intention,

- (ix) construction material and cost survey including the survey on availability of construction materials and laborers and their unit prices,
- (x) environmental survey including survey on condition of water pollution, ecosystem, soil erosion, and confirmation of endangered plant and animal species and historical and cultural assets, and
- (xi) 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 future agricultural development.
- (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 requirements and water supply,
 - (ii) 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,
 - (iii) irrigation development plan including rehabilitation program of existing irrigation and drainage systems, on-farm development consisting of land consolidation, land leveling, construction of tertiary and quaternary canals, tertiary and quaternary drains and farm roads, and effective water management and O&M system,
 - (iv) rural infrastructural development plan including construction of domestic water supply system, sewage facility, road, play ground and hall and others, if required, in each village, and
 - (v) environmental conservation plan including flood and sediment control, soil conservation, conservation of wild life, mitigation of water pollution particularly in the Lake Manyas.
- (c) Preparation of Interim Report which will describe the study results and the strategic and comprehensive development plan.

Phase-II: Feasibility Study

Field Work-II

- (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 the proposed secondary irrigation canals and drains and at several on-farm development areas to be selected for typical design,
 - (ii) construction material survey for embankment materials, sand and gravels,
 - (iii) agricultural and agro-economic survey for the following items:
 - crops variety, cropping pattern and live stock,
 - crop production and seed marketing system,
 - trend of demand and supply of agricultural products,
 - farming practice and mechanization,
 - incremental effect on yield by irrigation,
 - labor balance on farming practices,
 - profitability and marketability of crops,
 - agro-processing and post-harvest,
 - marketing, transportation and storing, and
 - institutional constraints to the project development,
 - (iv) survey on agricultural support system for the following items:
 - agricultural support system to introduce new crops and irrigation methods including demonstration or experimental farm,
 - research station, extension and credit,
 - government policy for agricultural development,
 - present activities and financial situation of organizations and institutions for the agricultural support system, and
 - constraints to the agricultural development,
 - (v) survey on rural infrastructure particularly for domestic water supply system, sewage, village-link road, play ground, village hall and others, if required,
 - (vi) cost survey for construction materials, construction equipment and laborers, and

- (vii) 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-II

- (a) Formulation of development plan consisting of:
 - (i) agricultural development plan including recommendable crops and cropping pattern, modernized farming practices, expected farm income after implementation of the Project, and improved marketing system, agricultural support system and farmers' organizations,
 - (ii) irrigation development plan including the calculation of water requirements and drainage module, preliminary design of irrigation and drainage systems, typical design for on-farm development works in several selected areas, and preparation of water management and O&M manual,
 - (iii) rural infrastructural development plan including the layout plan and typical design of water supply system, sewage facility, road, play ground and hall and others, if required, in a 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 and financial 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 investigation for every lines of 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 18 months in total for two phases as follows (See Figure 1):

Phase-I Study:	8 months
Phase-II Study:	10 months

The following foreign experts will be required for the Study:

- Team Leader/O&M Expert
- Irrigation /Drainage Engineer
- Agronomist
- Agro-economist
- Socio-economist
- Rural Development Expert
- Hydrologist
- Pedologist
- Geohydrologist
- Soil Mechanical Engineer
- Topographic Engineer
- Design/Cost Estimate Engineer
- Environmentalist

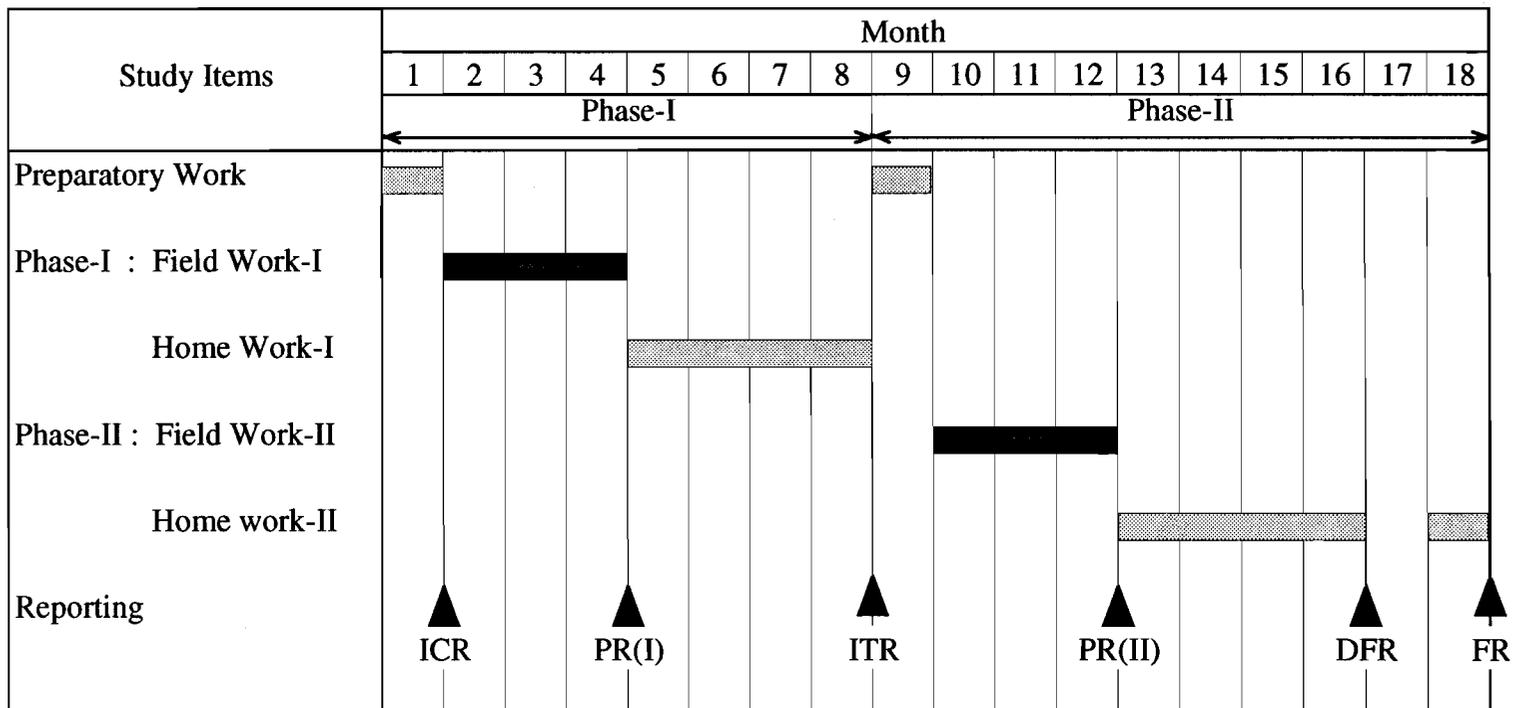
The required manpower input is estimated to be 80 man-months in total.

5.5 Expected Major Outputs of the Study

The major outputs of the Study are expected to be: (i) formulation of strategic and comprehensive development plan in the project area, and (ii) project evaluation from the technical and economical viewpoints and the implementation program of the project. These study results will be compiled in the following reports which will be submitted to the Government of Turkey.

Inception Report	:	within one month after start of the Phase-I Study
Progress Report (1)	:	at the end of the Field Work-I 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-II of the Phase-II Study
Draft Final Report	:	at the end of the Phase-II Study
Final Report	:	within one month after getting GDRS's comments on the Draft Final Report

Figure 1 Tentative Work Schedule



Note: Work in Turkey
 Work in Japan

ICR : Inception Report
 PR(I) : Progress Report (I)
 ITR : Interim Report
 PR(II) : Progress Report (II)
 DFR : Draft Final Report (Master Plan Report)
 FR : Final Report(Feasibility Report)



メリチ・エルゲネ地区
灌漑水路



メリチ・エルゲネ地区
排水路



メリチ・エルゲネ地区
農民ポンプ



メリチ・エルゲネ地区
圃場整備終了後の農地の風景

マンヤス地区
ダム・サイト
(工事中)



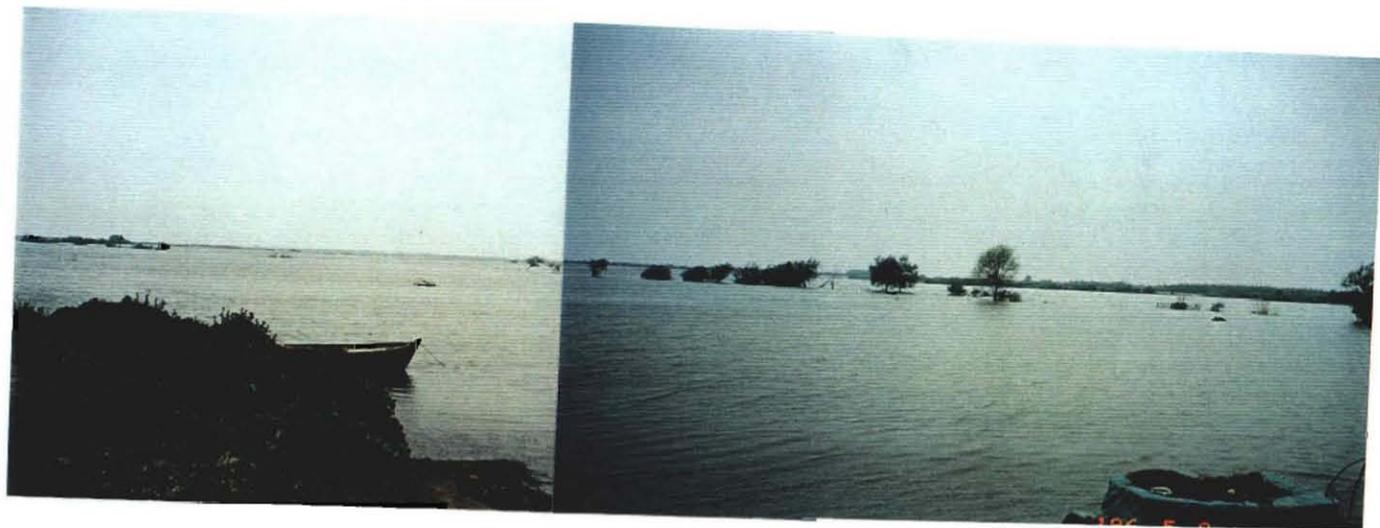
マンヤス地区
既存農地の風景



マンヤス地区
村落間道路



A - 55



マンヤス湖

B カザフスタン編

B. 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

カザフスタンは北緯40から56度、東経47から87度の間にあり、東西約3,000km、南北約1,800kmで面積は271万平方キロと日本の約7.1倍である。北部および北西部はロシアと、南部および南西部はウズベキスタン共和国、キルギスタン共和国、およびトルクメニスタン共和国の旧ソ連邦を形成していた中央アジア諸国と、東南部は中国新疆ウイグル共和国と国境を接しており、西部はカスピ海である。

1992年における人口は17.1百万人で多くの人種よりなる多民族国家である。主要民族はカザフ系(42%)、ロシア系(37%)、ドイツ系(5.8%)、ウクライナ系(5.4%)、ウズベク系(2.0%)などでありそのほかにも多くの民族が居住している。1979年より1989年の人口増加率は1.2%である。行政区は19州と2特別市より成立している。

1.2 地勢

東部および東南部には天山、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800-1000m程度の台地(カザフ小死火山地帯)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。

これらの平地を山脈を水源とする河川が流れている。代表的河川は、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てアラル海にそそぐシルダリア川、東南部を流れてバルハシ湖にそそぐイリ川および南部の小湖水にそそぐチュウ川、北西部と西部の平原を流れてカスピ海にはいるウラル川とエンバ川および北部平原を流れて北極海にそそぐイルテイシ川、イシム川およびトブル川などである。中央平原には大きな河川はない。

1.3 気候

気候はいわゆる大陸性気候で降水量が少なく、夏冬の気温差あるいは昼夜の気温差が大きい冷涼な温帯の乾燥地帯に属する。東部および東南部の山岳地帯および山麓の一部を除き降水量は非常に少ない。降水量は北部に比較的多く(年間300-400mm)、南部および南西部の平坦地は極端に降水量が少なく(年降水量200mm以下)、その一部は沙漠となっている。降水の型は地域により異なり北部は夏雨型である。そ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月までの間に分布する。一方、南部では冬雨型であり、作物の播種期である4月および5月まで降水が多少見られるが、6月以後10月までの降水量は極端に少ない。中部の降水量は年間を通じて変化がなく、非常に低い水準にある。

無霜期間は最大200日以上から最小100日以下まであり、北部および北東部で短く南部および西部にいくにつれて長くなる。年平均日照時数は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)日照時数は非常に大きく、ほとんどの地域で一日あたり8-10時間である。

1.4 社会経済の状況

1990年のソ連邦の解体に伴って従来の経済体制は完全に崩壊し、流通、決済システムにおける他の旧連邦共和国との経済的な関係が断ち切れ、カザフスタンの生産力は急速に低下した。また、CIS諸国間の経済関係の喪失、経済改革による混乱等の影響もあって同国の経済は大きく悪化した。GDPも1989年頃から低下し始め、実質GDP成長率も1991年に14.9%、1992年に14.3%、1993年に13.0%と3年連続して低下し、一人当たりのGNP額も1680ドル（1992年）にまで急減している。

旧ソ連邦時代の共和国分業体制の下では、カザフスタンはその豊富な地下資源とその半製品および穀物の供給基地の位置づけにあったことから、原材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。

労働力の面より見ると、1991年の潜在労働力は933万人であり、749万人が実労働力である。そのうち90%に当たる671万人が国营企業に従事している。農業セクターに従事するのは174万人で全体の25%を占めている。

貿易特に輸出に占める農産物の位置は高い。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産物のバランスは輸出の方が多し。農産物の輸出額は1989年で11.5億ルーブルで全輸出額（90.9億ルーブル）の12.6%を占めている。農産物の輸出先は98%が旧ソ連邦である。

1.5 農業の概況

全国土地面積（271万km²）のうち農牧に利用されている土地は約225万km²で約82%を占めている。農牧用地のうち約82%は放牧地であり、いわゆる耕地は18%に過ぎない。耕地の大部分は一年生の作物栽培に利用され、果樹園などの面積は非常に少ない。農牧用地の大部分は企業農場および集団農場に属し、厳密な意味での私有地は29万haに過ぎない。灌漑農地は全耕地の6%弱であり、主として南東部の5州（South Kazakhstan、Almaty、Taldykorgan、Kzyl Orda および Zhambyl）とSemei州に分布し、西部、北部および中央部には少ない。

農業は主として国营農場あるいは集団農場で行われていた。1992年には2,055の国营農場と430の集団農場があり、その平均耕作地面積はそれぞれ14,000haと9,800haで、従業員一人当たりの平均圃場面積は約20haであった。圃場面積は水田で4 - 6ha、畑では10 - 50haであり、使用する農機具は100PS級の大型トラクタとそれにみあう作業機である。農業も1992年以後急激に私企業化がすすめられており、現在では国有農場のほとんどが私企業化した。しかし、その経営形態の改善はなかなか進まず、依然として国有農場時代のままである。

ソ連邦の解体、独立後に社会体制が変化し、また、社会主義経済体制が自由経済体制に移行しつつあるため、経済に混乱が見られ、それが農業に影響をおよぼしている。すなわち、農業資材の市場は自由化されたのに対し、農産物は依然政府買い上げ価格と生産量の割り当てがあり、農産物の価格は低い水準に据え置かれている。そのため、農産物の価格に対する農業資材の価格の比率が上昇し、肥料、農薬などの農業資材の投入が減少するとともに農機具の維持管理も十分に行われなくなり、使用可能台数も減少している。そのうえ、灌漑農業地帯では、灌漑排水施設を維持管理するための予算がほとんどなく灌漑排水施設の機能は低下するとともに、排水不良による土壌表面への塩類集積および農地の湿地化が見られる。これらの結果、下表に示すように作物の栽培面積が減少し、収量の低下、

生産量の減少が見られる。

栽培面積

(単位：1,000 ha)

	1980	1985	1990	1991	1992	1993
全農地	40,500	40,700	39,600	39,300	38,800	38,000
灌漑農地	2,130	2,120	1,980	1,970	1,920	1,900

主要作物の収量

(単位：トン/ha)

	1980	1985	1990	1991	1992	1993
小麦	0.70	0.88	1.15	0.51	1.36	0.89
大麦	0.75	0.90	1.28	0.47	1.76	1.20
水稻*	4.33	4.36	4.65	4.40	3.86	3.61
トウモロコシ*	4.61	4.45	3.49	2.72	2.91	3.03
綿*	2.24	2.34	2.71	2.50	2.25	1.81
甜菜*	24.5	26.4	26.0	15.9	15.0	13.5

注：*；灌漑農業のみ

各作物の栽培面積はソ連邦時代は中央で決められた計画に従っていた。独立後は私企業化が進むとともに、公式的には作物選択の自由が認められているが、市場および流通経路の未整備と安価な食料の供給のために、農産物の政府買い上げ政策が依然として存在し、穀類作付けの割り当てが存在している。また、このほかに州政府が農場の作付け計画に介入し、各農場の自主的な作付け計画の設定を混乱させている場合や、不相当と見られる作物の作付けを強制している場合もある。

1.6 国家開発計画

1990年の独立以後、社会経済体制が計画経済より市場経済に移行した。しかしながら、それに伴う生産面および流通面の変化が大きかったため経済体制は混乱した。特に生産設備に維持管理費の不足が生じたために生産量は一時的に低下したが、この混乱は現在徐々に回復している。政府は各産業部門の生産力の増加および品質の向上を基本目標としている。

農業部門では、独立以来各作物ともに収量の低下が著しく、また、品質管理および流通が不充分であるため種々の問題が生じている。これに対応するため農業省は暫定的にここ数年間の農業開発の目標を以下のように設定している。

- (a) ソ連邦時代に強制的に耕地化された耕地のうち、耕地として不適当な土地は再び牧草地とする。
- (b) 灌漑農業地帯（主として南部の5州にある）の灌漑排水施設の改善を行ない、この事業が終了するまでは新しく灌漑農地を増加させない。
- (c) 各農場は政府よりの援助なしにその運営費は収益により賄う。その手段として、経営の合理化、栽培法の改善および新品種の導入により生産性の向上に努める。
- (d) 市場および流通経路の整備を行なうとともに農産物の品質管理を徹底する。そのために貯蔵施設の整備および収穫物の調整施設を整備する。

農業省は、今後の農業発展のためには灌漑農業地域における灌漑排水施設の整備が最重要であると見なし、今後10年間に於ける南部地域の灌漑農地775,000 haの灌漑排水施設の改善改良計画の作成と実施

を世銀に依頼し、現在作業は進行中である。さらに、現在収量低下の最大の要因である農場運営費の不足が生じている農場の経営の改善、とくに農場における作付体系および栽培法の改善に力を入れている。

2. 南カザフスタン州灌漑排水改善計画

2.1 事業の背景

(1) 調査対象地域

南カザフスタン州には120万haの耕地があり、このうち500,000haは灌漑農地で主にシルダリア川およびその支流であるアリス川、カラチック川沿いにある。現在、外国の援助により南部の3郡、すなわち、ジェチサイ、キロフおよびマフタル郡で灌漑施設の改修が計画されている。本計画の対象地域はこれら外国の援助の対象地域およびシルダリア水系に属さないスザク郡をのぞく南カザフスタン州の約35万haの灌漑農地を対象とする。調査対象地域の主要都市であるシムケントは首都アルマティの西方650kmにあり、この間は国道、鉄道および航空路で結ばれている。また、調査対象地域は14郡にまたがっており、総人口は約80万人である。

(2) 調査対象地域の概要

調査対象地域はシルダリア川、その支流のアリス川、カラチック川およびその他中小の支流沿いに発達した平坦地にあり、カザフスタン国の最南部に位置する。気候は大陸性で半乾燥地に属し、降水量は州都のシムケントで年間600mm、作物栽培期間の降水量は170mmと観測されている。年平均気温は摂氏12.2度で、無霜期間は180日である。

調査対象地域ではシルダリア川、アリス川、カラチック川およびシルダリア川最上流にあるチャルダラ貯水池を水源として灌漑農業が行なわれている。主要作物はワタ、イネおよび飼料作物でその他に輪作作物としてムギ類が栽培されている。ムギ類は灌漑農地と非灌漑農地に栽培されているが、灌漑農地における収量は非灌漑農地のそれに比べ2.5倍以上となっている。

当地域の水源施設として最も重要なチャルダラ・ダム（発電、洪水防御、灌漑の他目的）は1965年に、また、灌漑排水施設は1985年に完成した。その概要を示せば以下のとおりである。

(a) チャルダラ・ダム	
- 貯水容量	50億m ³
- ダム長	6,200m
- ダム高	30.0m
- 発電設備容量	25.0MW x 4 台
(b) 灌漑施設	
- 幹支線水路、	土水路 1,760km
ライニング水路	470km
- 3次水路、	土水路 3,120km
ライニング水路	330km
管路	70km

- 構造物、	幹支水路上	2,320個
	3次水路上	1,030個
(c) 排水路		
- 幹支線排水路、		1,050km
- 3次排水路		4,720km

上記灌漑施設は建設後10年しか経過していないが、予算不足のため維持管理が充分に行なわれておらず、その機能が著しく低下していることから灌漑水路よりの漏水が大きくなり、しかも水路に土砂が堆積して水路の配水機能を著しく低下させている。また、排水施設も当初から全面積の55%をカバーしているに過ぎず、加えて、維持管理費の不足から排水路の崩壊および排水ポンプの故障等での機能を十分果たしておらず、土壌の塩類化および湿地化による耕地の劣化が進んでいる。また、河川水および排水の塩類濃度が少しずつ上昇しているとも言われている。現在の灌漑水および排水の塩類濃度、土壌の塩類化の程度およびの概略を下表に示す。

灌漑水および排水の塩類濃度

	灌漑水 (g/l)			排水(g/l)		
	<1.0	1.0-3.0	>3.0	<1.0	1.0-3.0	>3.0
農地 (ha)	109,000	241,000	0	102,000	175,000	73,000
	(31%)	(69%)	(0%)	(29%)	(50%)	(21%)

不良土壌の面積

	良好	使用可	不良(地下水)	不良(塩類)	不良(地下水+塩類)	その他
農地 (ha)	182,000	95,000	25,000	18,000	21,000	9,000
	(52%)	(27%)	(7%)	(5%)	(6%)	(3%)

上述の表より、灌漑水中に含む塩分濃度が高く灌漑農業にとって問題があると見られる地域はほとんどないが、排水中塩分濃度の高い地域の面積は7.3万haで全体の20%強を占めている。また、灌漑地域の80%の土壌は現状では農業上大きな問題はないが、湿地化している土壌と塩類集積の進んでいる土壌は20%に達しており、今後排水が改善されなければこのような不良土壌は増加する可能性がある。

灌漑施設の機能の低下は灌漑計画を乱し作物の作付面積を減少させている。また、排水路の不備により湿地面積および塩類集積面積が増加し作付面積を減少させている。これに加えて、大幅な経費の削減による農機具の不整備および肥料などの農業資材の不足が生じたことにより、下表に示すように栽培面積と収量の低下がみられる。

主要作物の栽培面積

	(単位：ha)				
	1981-85	1986-90	1991	1992	1993
水稲	15,000	15,000	14,000	16,000	11,000
トウモロコシ	25,000	20,000	18,000	20,000	17,000
綿	92,000	88,000	82,000	77,000	76,000
ルーサン	127,000	131,000	122,000	162,000	125,000

主要作物の収量

(単位：トン/ha)

	1981-85	1986-90	1991	1992	1993
スイトウ	5.25	5.27	4.80	4.15	3.43
トウモロコシ	3.91	3.76	3.43	3.74	3.26
ワタ	2.34	2.58	2.50	2.25	1.81

上記問題を解決すべく農業省は外国の援助による灌漑施設の改修を企画し、調査対象地区外の南部3郡、すなわち、ジェチサイ、キロフおよびマフタル郡をモデル地区として世銀およびアジア銀に開発調査を依頼し、現在続行中である。

2.2 開発構想

本計画の主目的は、灌漑排水施設の老朽化による漏水、配水機能の低下、土壌表面への塩類集積および耕地の湿地化等の問題により、栽培面積の減少および作物収量の低下がみられる南カザフスタン州の灌漑地域を対象として、これら施設の改善および改良を含めた農業開発計画を策定し作物の増産を図ることにある。

計画の方向性としては、既存の灌漑排水施設の改修と一部配水施設の新設により作付け面積の増大を図るとともに、栽培技術の改良および農業経営力の強化により、水資源の節約とそれによる環境保全、農業生産量の増加および農民生活の向上を図ることを思考する。

計画は2期にわけ、第一期は調査対象地域全体を対象としてマスタープランを作成して優先順位を検討し、第二期において最優先地区を対象に以下の項目を詳細に検討し、この結果に基づいた開発計画を策定する。

- (a) 既存の灌漑配水施設の改修と改善、および緊急を要する配水不良問題の解決
- (b) 適正な灌漑配水計画の確立
- (c) 適正な作物の選択、栽培技術および私企業化に伴う農場経営法の確立
- (d) 効率的な水管理を目的とした施設の運営・維持管理体制の導入
- (e) 農業支援制度の導入および収穫後処理施設、農産物加工施設等を含めた農村工業体制の導入

2.3 総合所見

(1) 事業の特徴と意義

本開発計画のある南カザフスタン州はカザフスタン国における最大の灌漑農業地域であり、この国の全灌漑面積の40%強を占める。1990年のソ連邦解体以後、灌漑および排水施設の維持管理が悪く、作物栽培面積および収量が減少しつつある。カザフスタン政府は農業発展のための最重要課題として南部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、灌漑排水施設の改良・改修を行なうとともに、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義を持つ。さらに、今後の農業政策では、灌漑施設の運営が受益者である農民が主体となって運営する形態が中心となることから、本計画を通して、農民に施設の維持管理手法・技術を習得せしめることは意義がある。

(2) 相手政府の意向

カザフスタン政府の当事業にたいする高い優先度は事業実施局（PIU）局長、水資源管理委員会の土木局長および担当職員との面談を通じて確認できた。同時にPIUは当事業にたいする日本政府の技術および資金援助を望んでおり、ADCA調査団としても当事業を日本政府の優良なODA案件として取り上げることが望ましいと判断する。

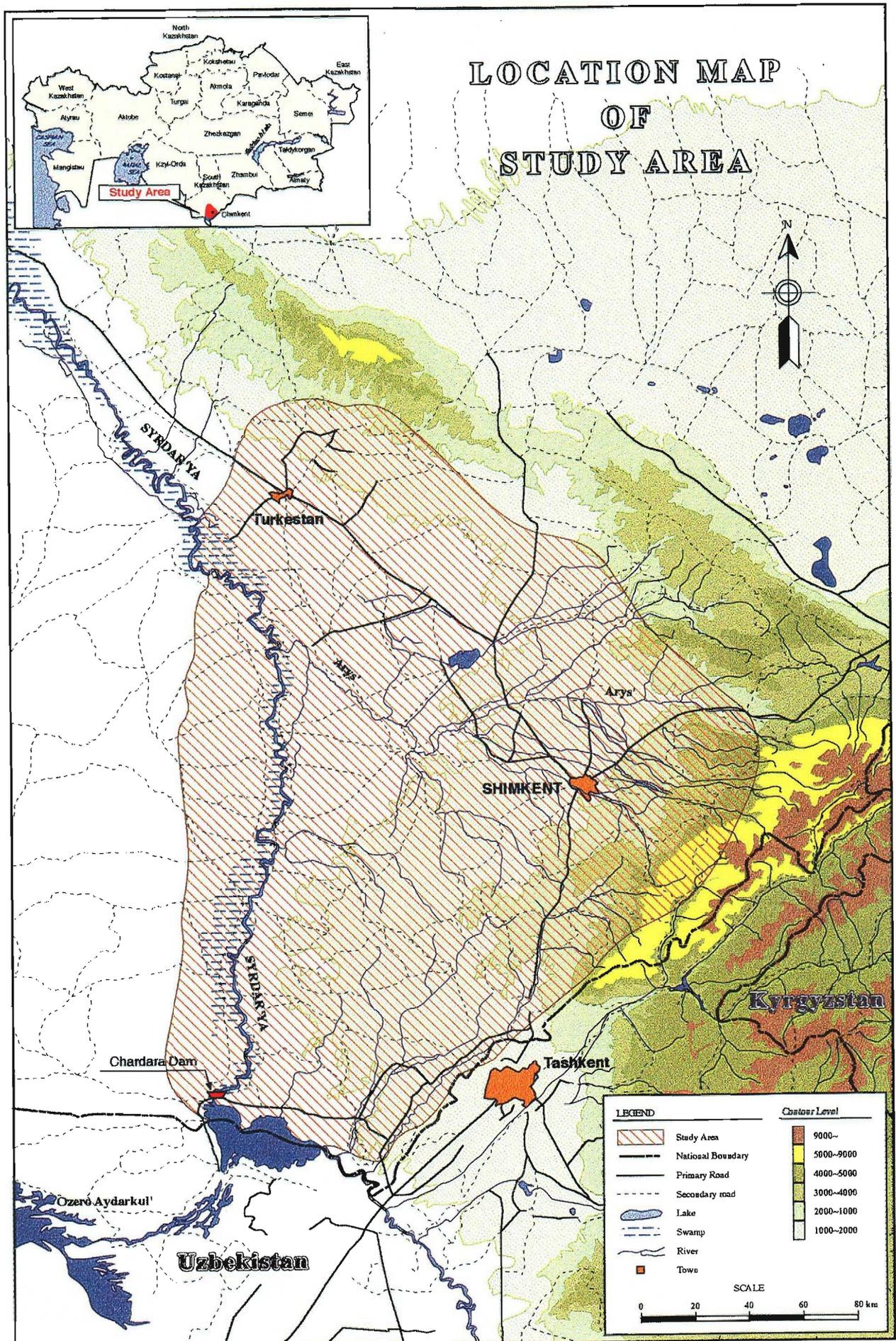


図-1 調査対象地域位置図 (南カザフスタン州灌漑排水改良計画)

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

1. Project Digest

1.1 Project Title

South Kazakhstan Irrigation and Drainage System Improvement Project

1.2 Location

Syr Darya River Basin in South Kazakhstan Oblast (region) excluding Suzak, Zhetysai, Kirov and Maktaral Rayons (districts) (See Attachment - 1: Location Map)

1.3 Implementing Agency

(a) Name of Agency

Ministry of Agriculture, Republic of Kazakhstan

(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 1997

(b) Implementation: Approximately 5 years from 2000

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

Kazakhstan, 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 lands, 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 Kazakhstan Oblast located

in the Syr Darya 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, (ii) increase of salinized and water-logged area due to lack of drainage system, and (iii) improper cultural practice and shortage of agricultural machinery.

South Kazakhstan Oblast is the largest irrigated agriculture area in Kazakhstan. It has about 0.5 million ha of irrigated land, of which 0.42 million ha was cropped in 1990 and less than 0.4 million ha in 1993, which shows the decrease of cropped area also in this Oblast due to the same reasons as mentioned in the above. The irrigation efficiencies observed in this Oblast ranges from 35% to 50%, and as a result water loss in the canal system is substantially high. The reason of high loss of irrigation water is explained by improper water management and deterioration of irrigation canal system. This high water loss results in lowering the runoff of the Syr Darya river that flows into Aral Sea, with an adverse impact on the lower Syr Darya Basin and Aral Sea. Meanwhile, the deteriorated drainage system increases water-logged area and causes salinity problems. Improvement of irrigation and drainage system, water management and cultural practice in the oblast is, 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 Kazakhstan, 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 Year 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 Syr Darya river basin were given a high priority, and the Government requested the Government of Japan to make a feasibility study for the Kzyl Orda Irrigation/Drainage and Water Management Improvement Project under its Technical Cooperation Programme. As the succeeding project to the above, the Government of Kazakhstan intends to take up the rehabilitation and improvement work for the irrigation and drainage facilities in South Kazakhstan Oblast.

2.3. Problems to be Solved in the Sector

The irrigated area in South Kazakhstan Oblast has specific problems to be solved through rehabilitation and improvement. Major problems are:

- (i) 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 South Kazakhstan Irrigation and Drainage System Improvement Project has following objectives:

(a) Short-term objectives

- (i) to improve efficiency of water application,
- (ii) to improve efficiency in irrigation and on-farm facilities,
- (iii) to improve drainage system, and
- (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 and export.
- (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 Syr Darya 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) rehabilitation and improvement of existing main canal and interfarm irrigation and drainage systems and construction of interfarm new drainage system,
- (ii) on-farm development, including construction of tertiary canals, field ditches, tertiary drains, field drains and farm roads,
- (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,
- (iv) improvement of agricultural supporting system, including agriculture extension service, agricultural credit and marketing, and
- (v) establishment of effective water management and O&M system.

(3) **Prospective Beneficiaries**

Some 100 stock farms and cooperative farms with a total population of 200,000 persons are included in the irrigated area in South Kazakhstan Oblast. 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 Oblast.

(4) **Project Priority in National Development Plan**

For the agricultural development in Kazakhstan, the Government gives the first priority to the rehabilitation and improvement of existing irrigation and drainage systems located in the southern part of the country. Amelioration of irrigation and drainage systems and soil in the irrigated area in South Kazakhstan Oblast 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). In addition to this World Bank activity, the Government of Japan has a plan to extend a technical cooperation for the Kzyl Orda Irrigation/Drainage and Water Management Improvement Project from August 1996.

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 South Kazakhstan Oblast, as well as in the capital city of Almaty.

5. Global issues

(1) Environmental Components

The proposed Study involves an environmental component of great significance. The improvement of irrigation and drainage systems and water management will mitigate the environmental deterioration caused by excessive water consumption in the Study Area, as well as in the lower reaches of the Syr Darya river and in Aral Sea 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 a favourable impact in the environment of the downstream areas in the lower Syr Darya river, as well as in the environment of 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 Kazakhstan

In order to facilitate a smooth and efficient conduct of the Study, the Government of Kazakhstan 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 Kazakhstan 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.

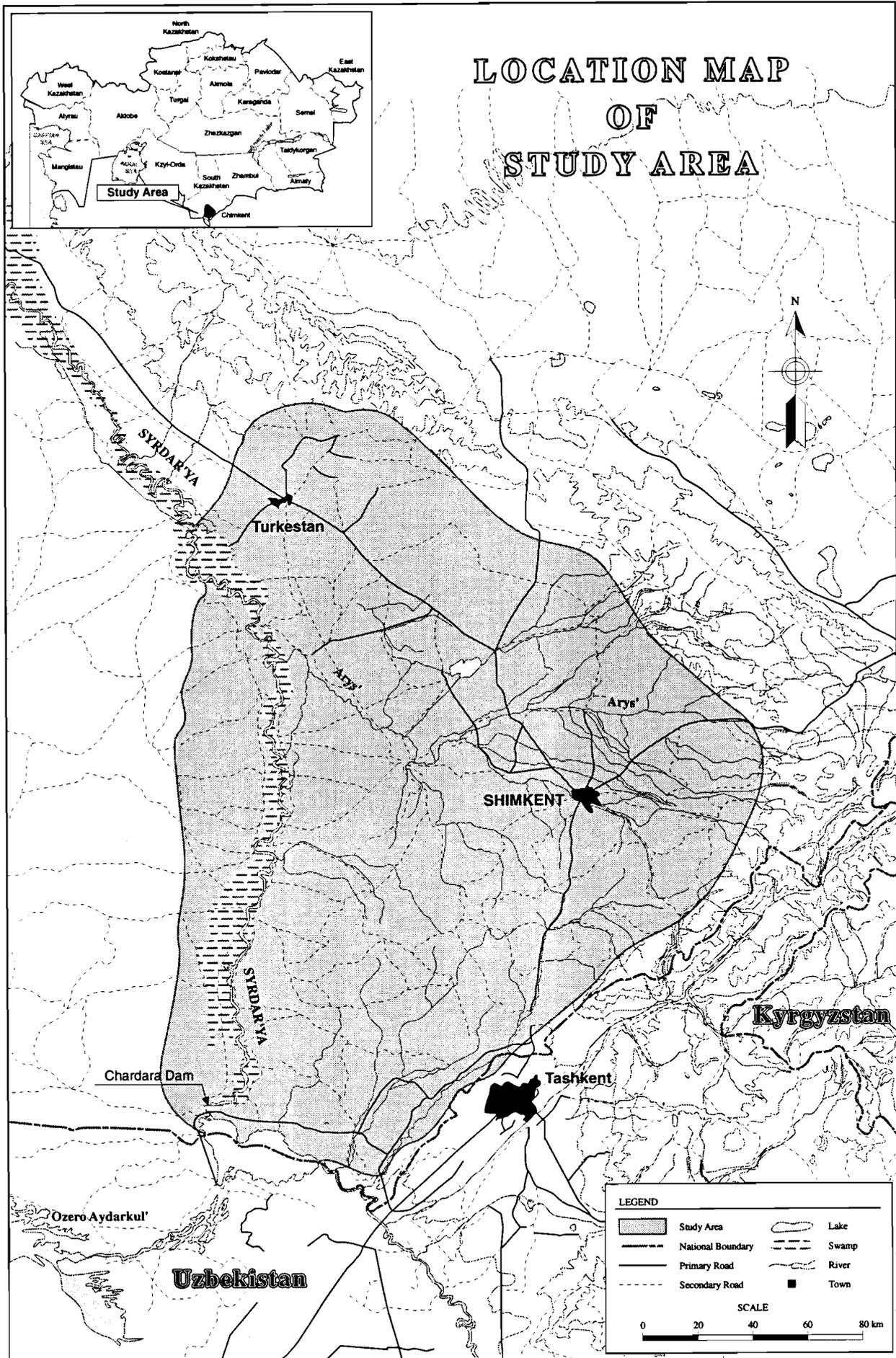
The Government of Kazakhstan assured that the matters referred in this form will be ensured for a smooth conduct of the Development Study by the Japanese Study Team.

Signed:

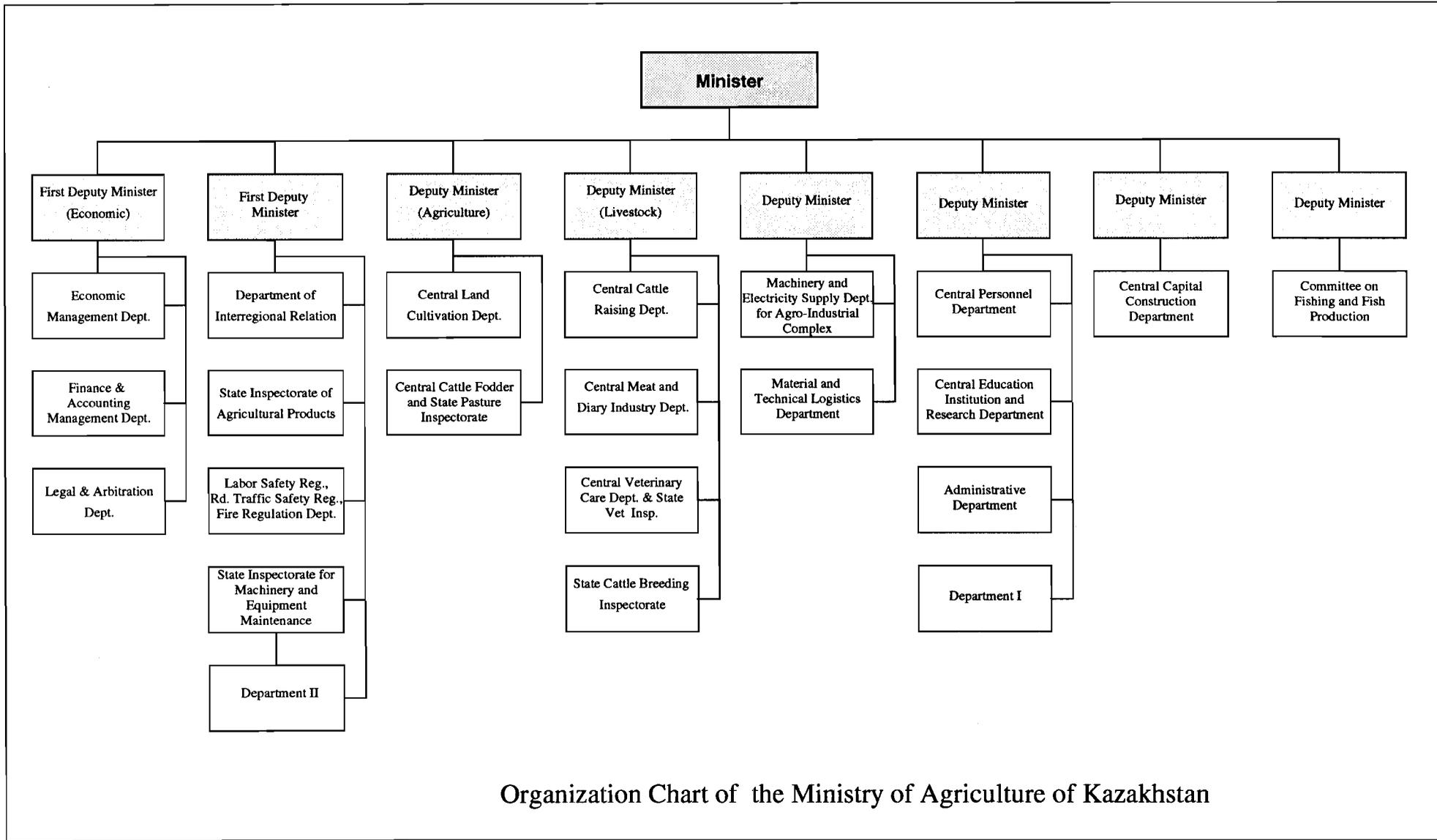
Titled:

On behalf of the Government of the Republic of Kazakhstan

Date:



South Kazakhstan Irrigation and Drainage System Improvement Project



Organization Chart of the Ministry of Agriculture of Kazakhstan

B - 16

Attachment-2

**Terms of Reference
for
The Feasibility Study
on
South Kazakhstan Irrigation and Drainage System Improvement Project**

1. Background and Justification of the Study

The South Kazakhstan Oblast has cultivated lands of 2 million ha, of which about 500,000 ha are equipped with irrigation and drainage systems. The major crops in the irrigated area are cotton, paddy, winter wheat and lucerne. Cotton and paddy cultivation in the area has, however, turned out to be less efficient due to excessive water consumption, as well as inefficiency in irrigation and drainage systems. Recently, cropped area and yields of crops show a decreasing tendency. The main reasons of these are improper water distribution due to deterioration of irrigation canal system caused by inadequate maintenance and increase of salinized and water-logged areas due to improper drainage system.

Under such inferior conditions for the profitable agricultural development, the Government of Kazakhstan has a plan to implement the rehabilitation and improvement of irrigation and drainage systems for the area of 350,000 ha which excludes the area of 125,000 ha included in Zhetysai, Kirov and Makhtaara Rayons (districts) where World Bank and Asian Development Bank have development plans, and 25,000 ha in Suzak district which is out of the Syr Darya river basin. Since this implementation plan covers a vast area, it is necessary to make a master plan to determine the stage-wise development program and feasibility study for the priority area to be determined in the master plan, 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 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 advance technologies will be introduced to Kazakhstan 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 proposed Study are to formulate a strategic and comprehensive development master plan with a main emphasis on rehabilitation and improvement of irrigation and drainage facilities and land amelioration, and to carry out a feasibility study on the selected typical and priority project with an irrigation area of some 30,000 ha for balanced and systematic development.

4. Study Area

The Study will primarily be concentrated on the irrigation area of 350,000 ha and its surrounding area in the South Kazakhstan Oblast (excluding Sairam, Zhetysai, Kirov and Makhtaral Rayons).

5. Scope of the Study

5.1 General

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

- (a) Master plan study for the above mentioned Study Area.
- (b) Feasibility study for priority irrigation project in the order of 30,000 ha.

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

Phase-I: Master Plan Study

Field Work-I: Data collection, field survey and investigation and formulation of basic development plan.

Home Work-I: Analysis, study and preparation of Master Plan Report (Interim Report)

Phase-II: Feasibility Study

Field Work-II: Topo-survey, supplementary data collection, field survey and investigations mainly for the priority project area.

Home Work-II: Analysis, study and preparation of Feasibility Report (Draft Final Report and Final Report)

5.2 Detailed Scope of the Study

Phase-I: Master Plan Study

Field Work-I

- (a) Data collection and review on:
 - (i) natural resources including topography, meteorology, hydrology, geohydrology, salinity and soil,
 - (ii) socio-economy including population and number of households, social structure and social infrastructure, income, living standards, national and regional development plan, 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 input, 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 road, domestic water supply system, electric supply system, telecommunication system, sewage system, post-harvest and storage facilities,
 - (vii) farmers' organization 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 irrigation project,
 - (ii) geohydrological survey including review of existing geohydrological study, confirmation of existing well location, 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 existing aerial photo and 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 farmers' desire and intention to agricultural development, and survey on present conditions and constraints of the agricultural supporting services,
 - (vii) rural infrastructural 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, agro-processing facility, school and health center, 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 condition of water pollution, ecosystem, soil erosion, 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 future agricultural development.
- (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 requirements and water supply,
 - (ii) study on the countermeasures to salinization of agricultural land,
 - (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 program of existing irrigation and drainage systems, on-farm development consisting of construction of tertiary and quaternary canals, tertiary and quaternary drains and farm roads, and effective water management and O&M system,
 - (iv) rural infrastructural development plan including construction of domestic water supply system, sewage facility, road, post-harvest and storage facilities,
 - (v) environmental conservation plan including soil conservation, conservation of wild life, mitigation of water pollution and betterment of environment in the lower basin of the Syr Darya river and Aral Sea,
 - (vi) estimate of project implementation cost,
 - (vii) project evaluation from technical and economical viewpoints and selection of priority project, and
 - (viii) 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: Feasibility Study

Field Work-II

- (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 and at several on-farm development areas selected for typical design,
 - (ii) construction material survey for embankment materials, sand and gravels,
 - (iii) agricultural and agro-economic survey for the following items:
 - farming practices, cropping pattern and crop variety,
 - crop production and animal husbandry,
 - incremental effect on the yield of crops by improvement of irrigation an drainage system,
 - labor balance on farming practice,
 - profitability and marketability of crops,
 - post harvest, agro-processing, storing and transportation, and
 - institutional constraints to the project development,
 - (iv) survey on agricultural support system for the following items:
 - agricultural support system to introduce new crops and irrigation methods including demonstration or experimental farm,
 - research station, extension and credit,
 - government policy for agricultural development,
 - present activities and financial situation of organizations and institutions for the agricultural support system, and
 - constraints to the agricultural development,
 - (v) survey on rural infrastructure particularly for domestic water supply system, sewage facility, village-link road, community center and others, if required,
 - (vi) cost survey for construction materials, construction equipment and laborers, and

- (vii) 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 feasibility study.

Home Work-II

- (a) Formulation of development consisting of:
 - (i) agricultural development plan including recommendable crops and cropping pattern, 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 development plan including the calculation of water requirement and drainage module, preliminary design for rehabilitation of existing irrigation and drainage systems and new irrigation and drainage systems, typical design for on-farm development works in several selected farm plots and preparation of water management and O&M manual,
 - (iii) rural infrastructural development plan including domestic water supply system, sewage facility, road, post-harvest and storage facilities and community center, if required,
 - (iv) preparation of project implementation program,
 - (v) estimate of project cost including investment cost and O&M cost, and
 - (vi) project evaluation from economical and financial 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 investigation for every lines of foreign experts assigned.
- (b) Plan and design for irrigation and drainage system, on-farm development and rural infrastructures.

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 20 months in total for two phases as follows (See Figure 1):

- Phase-I Study: 9 months
- Phase-II Study: 11 months

The following foreign experts will be required for the Study:

- Team Leader/O&M Expert
- Irrigation /Drainage Engineer
- Agronomist
- Agro-economist
- Sociologist
- Hydrologist
- Pedologist
- Geohydrologist
- Soil Mechanical Engineer
- Topographic Engineer
- Design/Cost Estimate Engineer
- Environmentalist

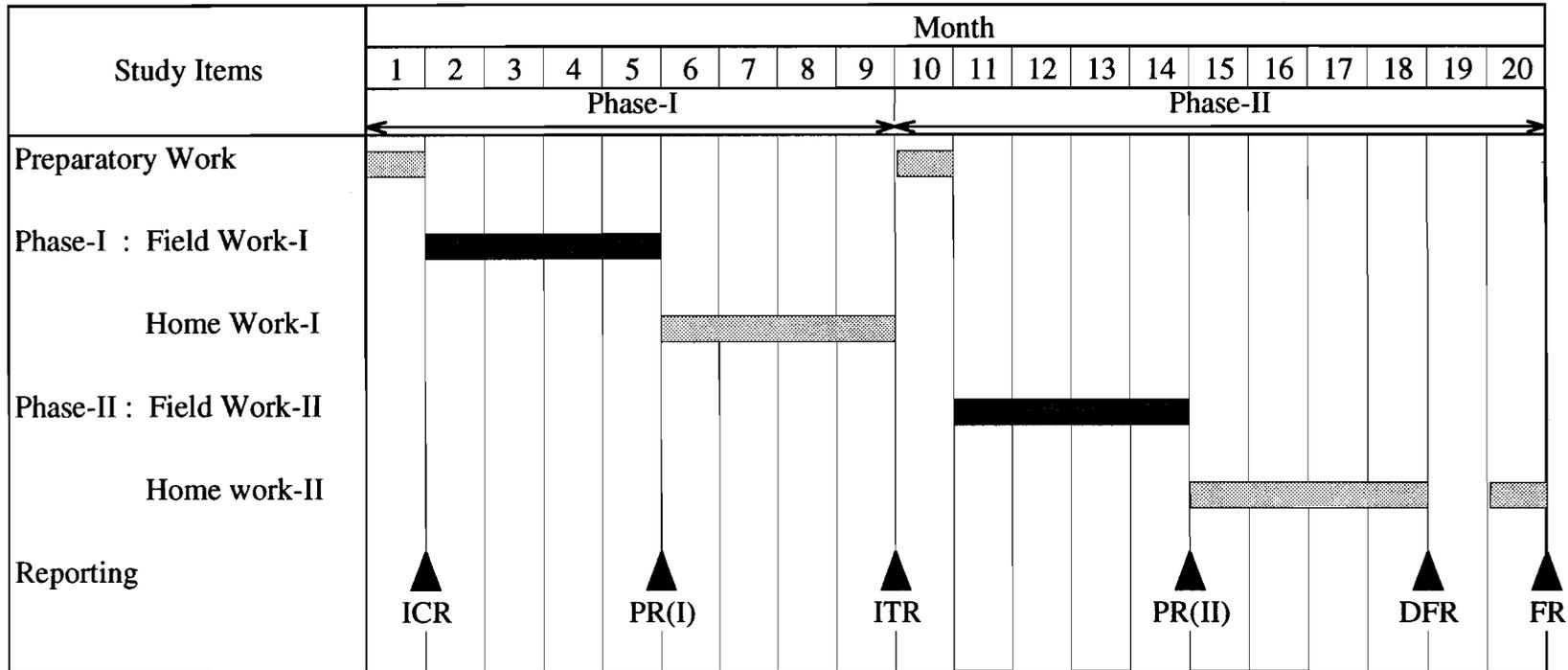
The required manpower input is estimated to be 90 man-months in total.

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 total study area with the priority order of agricultural development for respective projects included in the Study Area, and (ii) project evaluation from the technical and economical viewpoints and the implementation program for the priority project. These study results will be compiled in the following reports which will be submitted to the Government of Kazakhstan.

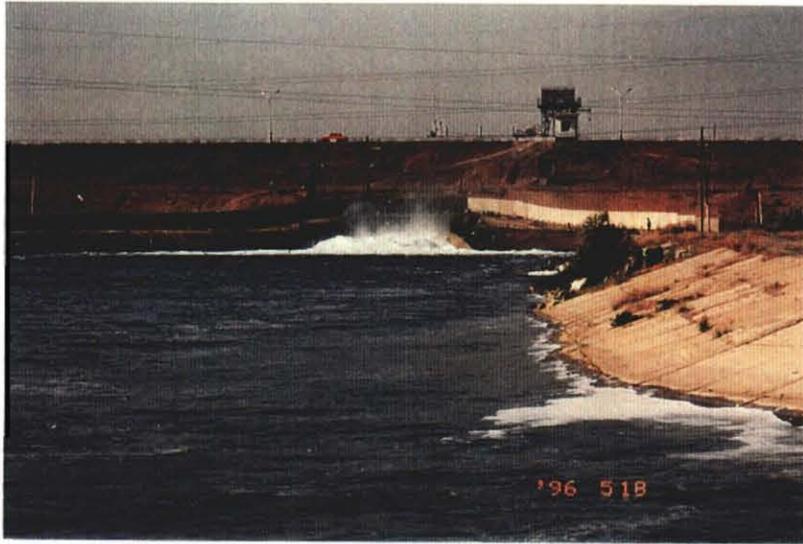
- Inception Report : within one month after start of the Phase-I Study
- Progress Report (1) : at the end of the Field Work-I of the Phase-I Study
- Interim Report : at the end of the Phase-I Study
- Progress Report (2) : at the end of the Field Work-II of the Phase-II Study
- Draft Final Report : at the end of the Phase-II Study
- Final Report : within one month after getting MOA's comments on the Draft Final Report

Figure 1 Tentative Work Schedule

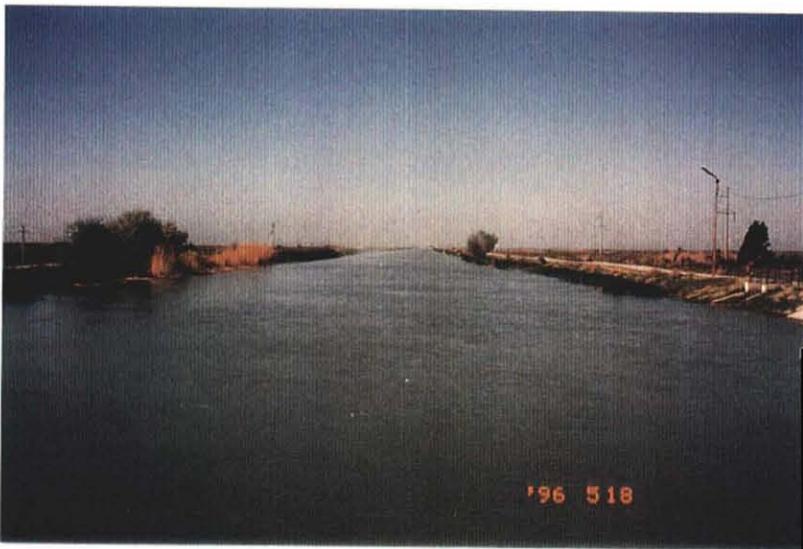


Note: Work in Kazakhstan
 Work in Japan

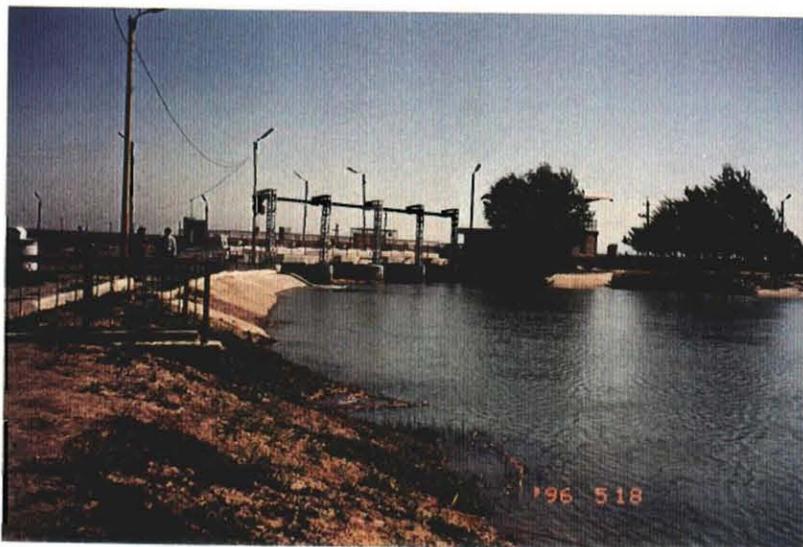
ICR : Inception Report
 PR(I) : Progress Report (I)
 ITR : Interim Report
 PR(II) : Progress Report (II)
 DFR : Draft Final Report (Master Plan Report)
 FR : Final Report (Feasibility Report)



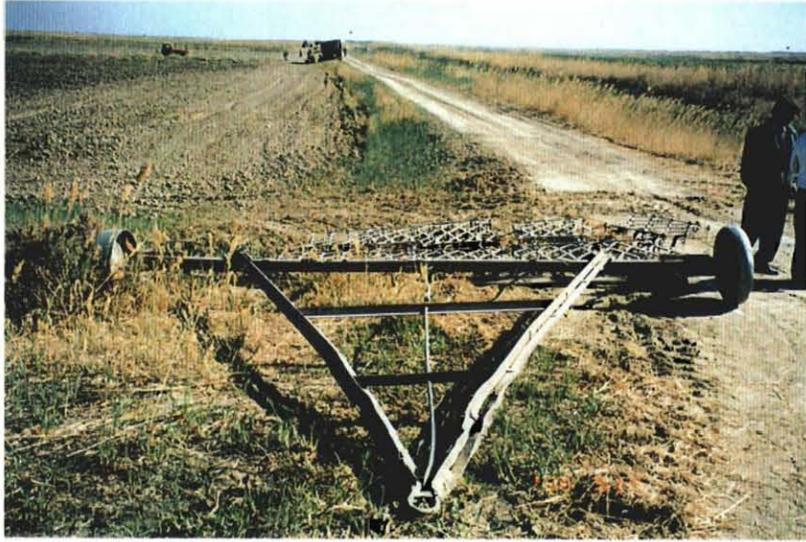
南カザフスタン州
チャルダラ・ダム洪水吐



南カザフスタン州
クジルクム主水路



南カザフスタン州
クジルクムチェックゲート



南カザフスタン州
既存農地の風景

C 添付資料

ADCAミッション調査工程

日順	年/月/日	曜日	活動内容	宿泊地	備考
1	8/5/4	土	移動(成田-フランクフルト)	フランクフルト	NH 209にて移動
2	8/5/5	日	移動(フランクフルト-アンカラ)	アンカラ	LH 3822にて移動
3	8/5/6	月	村落総局と打ち合わせ、JICA表敬 移動(アンカラ-イスタンブール)	イスタンブール	TK 145にて移動
4	8/5/7	火	現地調査(メリジ・エルゲネ地区)	チャナッカレ	
5	8/5/8	水	現地調査(バリケシル・マンヤス地区) 移動(チャナッカレ-イスタンブール)	イスタンブール	車両にて移動
6	8/5/9	木	移動(イスタンブール-アンカラ) 村落総局に調査結果報告	アンカラ	TK 116にて移動
7	8/5/10	金	日本大使館およびJICAに調査結果報告 資料収集	アンカラ	
8	8/5/11	土	資料整理	アンカラ	
9	8/5/12	日	移動(アンカラ-イスタンブール)、(イスタンブール-)	機中泊	TK 139, TK 630にて移動
10	8/5/13	月	移動(-アルマティ) 日本大使館および農業省表敬	アルマティ	TK 630にて移動
11	8/5/14	火	農業省と農業省と打ち合わせ 資料収集	アルマティ	
12	8/5/15	水	資料収集・整理	アルマティ	
13	8/5/16	木	資料収集・整理	アルマティ	
14	8/5/17	金	移動(アルマティ-シムケント)	シムケント	K4 1505にて移動
15	8/5/18	土	現地調査(シムケント地区)	シムケント	
16	8/5/19	日	移動(シムケント-アルマティ)	アルマティ	K4 1502にて移動
17	8/5/20	月	日本大使館および農業省に調査結果報告	アルマティ	
18	8/5/21	火	移動(アルマティ-フランクフルト)、(フランクフルト-)	機中泊	LH 3321, LH 710にて移動
19	8/5/22	水	移動(-成田)	日本	LH 710にて移動

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	その他各国営農場および集団農場役員多数	