バングラデシュ人民共和国

チッタゴン丘陵地域荒廃地回復計画
クルナ地区農業持続可能開発計画（フォローアップ調査）

プロジェクトファインディング調査報告書

平成13年6月

社団法人　海外農業開発コンサルタンツ協会

まえがき

2001年6月9日から6月28日まで、20日間バングラデシュ国を訪問し、農業・農村総合開発計画のプロジェクトファインディング調査を実施した。

小職は、この調査に先立ち、南アジア地域協力連合（SAARC）のうち、インド、パキスタン、ネパール、ブータンには数度訪問し、特にインド、ブータンでは JICA の開発調査案件の団長を務めた。バングラデシュ国の訪問は今回が2回目であった。

今回、訪問したバングラデシュ国は人口 12,043 万人、国土面積 14.4 万 km^2 である。

バングラデシュ国における農業部門は国内総生産（GDP）の 34％を占めており、農業就業人口は労働人口全体の 80％に達している。今回の調査案件は2件で、そのうちクルナ地区農業持続可能開発案件は、1999年3月にP／F調査を実施した案件のフォローアップ調査で、担当の農業省農業普及部と打合せしたが、非常に関心を示し、至急日本政府に要請するとのことである。

クルナ地区は、多くの河川、氾濫地域および塩分を含有し当該区はサンダーバンの近郊に位置し、世界最大規模を有するマングローブ林は、農業気象上の本地区の特色となっている。農業生産性は、塩害、土壌汚染、灌漑施設の老朽化、不適切な水管理、不安定な降雨および乏しい技術基盤により、非常に低いものになっている。

約 12 万 ha の耕作地は塩害の影響を受けており、全耕作地の 5.75％で灌漑農業が行われている。土地・水資源が整備され、適切な土壌、用水、栽培技術の開発・実施が行われれば、本地区の阻害要因を含む現状は改善され、食糧自給も可能になると思われる。

今回新たに、発掘したプロジェクトはチッタゴン丘陵地域荒廃地回復計画である。

チッタゴン丘陵地域（CHT）は、バングラデシュの南東に位置する丘陵地域である。平地が地域の 5％以下を占め、ここでは定着農業が可能である。残りの 95％に相当する地域には樹木があり、畑地、アグロフォレストリー、および山林となっている。CHT は多種多様な動植物の生息地となっている。さらに少数民族が焼畑農業を営んでいる。現在約 4 万 ha の土地が、4、5 年のサークルで焼畑農業に利用されており、この状態は、土壌の肥沃度、生物多様性、および森林の回復を困難にし、結果として、CHT の全体的な生態系を徐々に悪化させている。

一方、過去 20 年間において政府による平地からの定住計画や新たな出生により、CHT の人口は倍増し、130 万 ha の山地に 120 万人が住む状況となっている。これは既に CHT の収容能

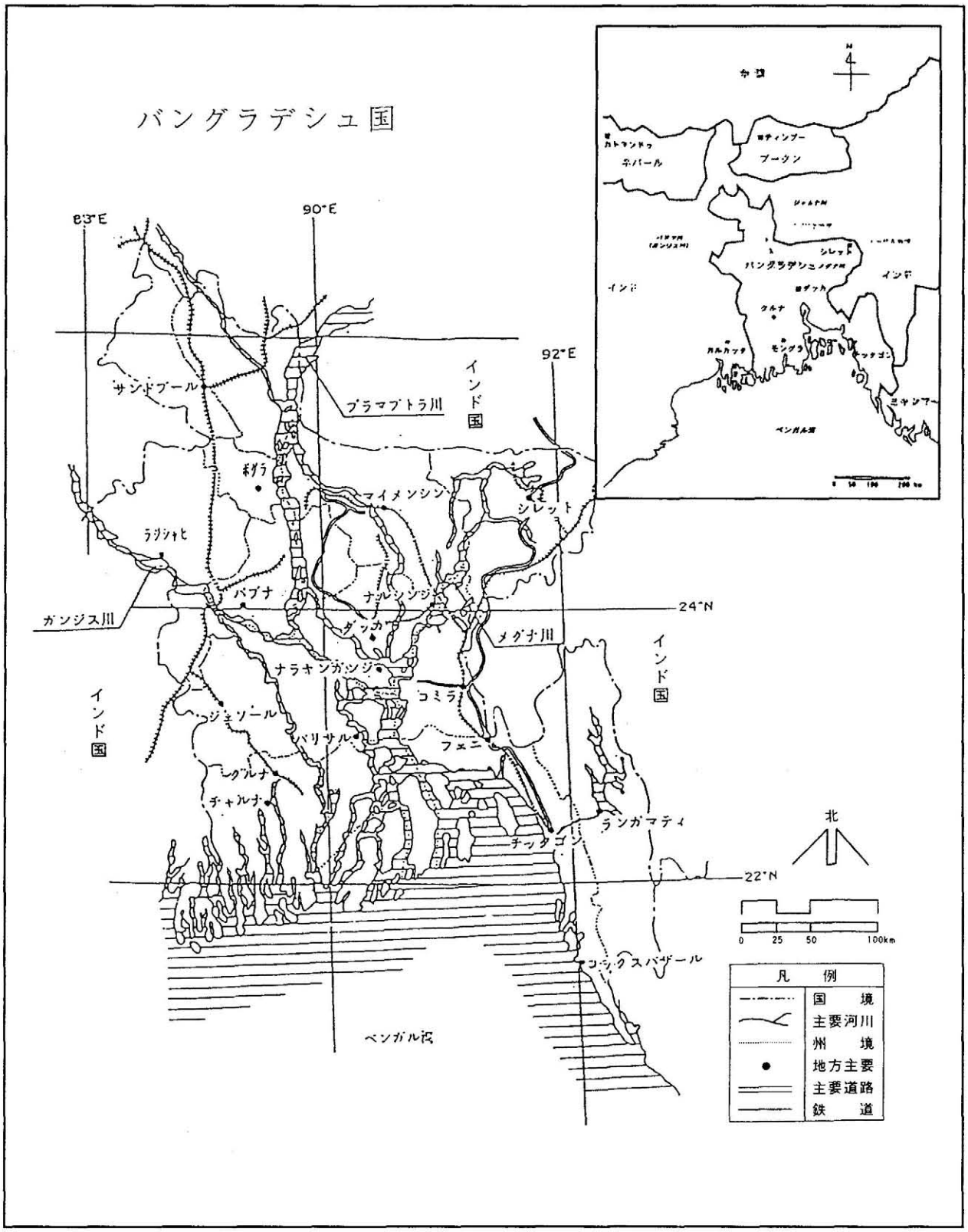
力を超えている。さらに、1974 年以来地域ではびこっている暴動により正常な経済開発行動が影響を受け、少数民族とベンガル人との間に民族的不信が増しており、これらの結果開発環境が損なわれている。

CHT 地域の土壌、生物、および気候的条件は多種多様な植物種の栽培に適しており住民もまたこれらに通じている。本計画は、CHT 森林地域における現状の分析と開発ポテンシャルを検討し、適切な開発計画を立案するものである。

最後に、今回のプロジェクトファインディング調査に、ご指導、ご協力いただいた、在バングラデシュ国日本国大使館、JICA ダッカ事務所、バングラデシュ国政府関係機関、および調査にご協力いただいた三菱（商）ダッカ事務所の方々に深甚なる謝意を表する次第です。

2001 年 6 月

バングラデシュ国
農業・農村総合開発事前調査団長
金 津　昭 治


バングラデシュ国
83°E
90°E
92°E
24°N
22°N
サンドプール
ブラマプトラ川
インド国
ボグラ
マイメンシン
シレット
ラジシャヒ
パブナ
ナラインジ
ガンジス川
ダッカ
メグナ川
ナラヨンガンジ
コミラ
ジェソール
バリサル
フェニ
クルナ
チャルナ
チッタゴン
ランガマティ
コックスバザール
ベンガル湾
北
0 25 50 100km
凡例
国境
主要河川
州境
地方主要
主要道路
鉄道

農業省農業普及総局長との打ち合わせ

チッタゴン丘陵開発省次官との打ち合わせ

Chittagong 駅構内

Chittagong 市中央市場

Chittagong 港。同国最大の港である。

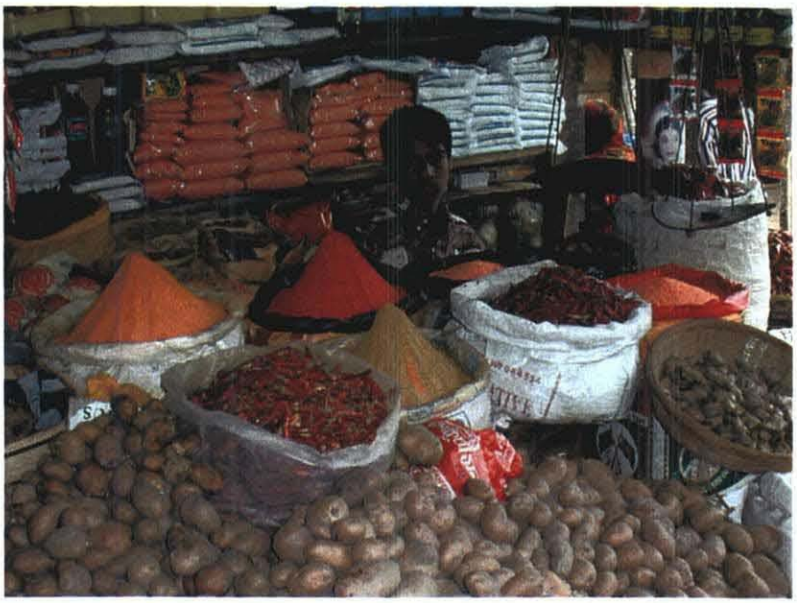
Rangamati 市街地。湖岸に広がっている。

Rangamati 市の道路状況

Rangamati 市船着場へ続く道路

Rangamati DAE 事務所

Rangamati 市市街地



Rangamati 市中央市場

傾斜地農業

渇水期に湖底で水稲作を行っている。

傾斜地農業地帯
とうもろこしとバナナの混生栽培

傾斜地農業　陸稲とバナナ

河川沿いの畑

Mongla 港　同国第 2 の港

淡水えびの陸揚げ

クルナ市中央市場

クルナ市近郊の田園風景

雨季のマングローブ林

ジョショール近郊のジュート畑

ジョショール近郊の水田

目　次

付属資料

第1章　概　　要

第1章　概　　要

1-1　国の概要

バングラデシュ国は、周囲をインドに囲まれ、南東部だけミャンマーに接し、南はベンガル湾に臨んでいる。

バングラデシュ国はガンジス（パドマ）、プラマプトラ（ジャムナ）河が合流するデルタ地帯に位置し、米作、ジュートを中心とした、水と緑豊かな農業国である。土地が肥沃なこともあり、古代からドラヴィダ系、オーストロイド系、モンゴロイド系などの各民族が入り込み、農業中心の生活を営んできた。中世から近世にかけては、ムガル王朝やイギリスによる統治を受けていたが、147年のインド・パキスタン独立の際、西部インドのパンジャブ地域と共に飛び地国家パキスタンを形成した。しかし、西パキスタン州にある中央政府によるウルドゥー語の国語化の動き（バングラデシュ国のベンガル語は、ウルドゥー語と文法も文字も異なる）や経済的搾取のため、次第に東パキスタン自治独立の気運が高まっていった。171年3月26日独立宣言し、同年12月16日パキスタン軍の降伏とともに事実上独立を成し遂げた。

バングラデシュ国は、国土面積14.4万km^2（日本の40%の国土）に、1億2千万を超える人口を抱える。加えて約2.6%の人口増加率は深刻な問題である。首都のダッカ市は、470万人（ダッカ首都圏は1,011万人。1998年3月、Bureau of Statisticsの統計）である。その歴史は、古代にまで巡ることができるが、主として発展し始めたのは17世紀に入ってからである。以降英領インドおよびパキスタン時代、それぞれの州都を経て現在に至っている。

その他の主要都市として、チッタゴン市（国際港で人口172万人）、クルナ市（人口74万人）、ラジシャヒ市（人口34万人）。

宗教の人口に占める割合は、イスラム教徒86.6%、ヒンドゥ教徒12.1%、仏教徒0.6%、キリスト教徒0.4%、その他0.3%となっている。

気候は典型的な亜熱帯モンスーン気候で多雨多湿である。11月から2月までが温暖な乾期で（最低気温10度前後）晴天が続き、一年中で最も過ごしやすい時期である。3月から5月にかけて厚い雲が空を覆い始め、北西風が吹き、気温が一気に上昇し、時々大スコールとなる。4月、5月は一年中で最も暑い時期である。6月から10月まではモンスーン季で、気温はやや下がるが、雨量が多く最も多湿な時期で湿度は90%を越える。ベンガル湾から時折サイクロンが来襲するのもこの時期である。

1997年度ダッカ市気象局統計

		7月	8月	9月	10月	] 1月	12月	1月	2月	3月	4月	5月	6月
気温	最高平均℃	31.7	32.7	31.5	32.1	30.6	25.0	22.7	28.4	30.5	32.7	33.3	34.3
	最低平均℃	26.4	26.6	25.5	22.1	18.9	18.7	12.2	16.1	18.6	22.9	25.3	28.1
湿　度（%）		86	84	86	77	75	80	80	81	81	80	77	82
雨　量（nm）		549	230	440	30	1	22	49	4	83	177	405	89

1-2　政治・経済の現状

(1) 政　　治

1) 独立以降の度重なる政変を経て、現在のバングラデシュ政界は、与党アワミ連盟（AL）と野党第一党であるバングラデシュ民族主義者党（BNP）の二大政党が勢力をほぼ二分している。1990 年から 91 年にかけての民主化運動直後の選挙で誕生した BNP 政権に代わり、1996 年 6 月の選挙ではアワミ連盟が約 21 年ぶりに政権に返り咲いた。しかし、同政権も折り返し時点を過ぎたあたりから、かつてアワミ連盟と連立にあった国民党が踵を返して BNP と手を結び、加えてイスラム原理主義のジャマティ・イスラミおよびイスラミ・オイッコ・ジョートから成る野党大連合の反政府運動に直面している。与野党間の対立は、各党首の相互不信を背景に、限られた権益、資源を奪い合う形で、官僚機構、公的団体、労働組合、地域の利益集団等社会のあらゆるレベルを縦断しているといっても過言ではない。また、選挙以外の手段による政権交替が繰り返されてきた歴史的事情もあり、与野党対立の対話を通じた平和的解決の兆しは見えない。

2) 野党連合は、1999 年 8 月末の第 14 次会期以降国会審議をボイコットし、その活動を街頭に移した。ただし、1999 年には通算 27 日行われた全国規模のハルタル（ゼネスト）が、2000 年には 13 日に減り、質的にも求心力に欠けた散漫なものとなるなど、野党の運動にも変化が見られる。その背景には、ハルタルが常態化し、その有効性が薄れたこともさりながら、結果的な経済活動への悪影響や、敵対的な与野党対立が社会全体の治安悪化の原因であるとの認識が、都市部を中心とした一般国民の中に定着しつつあり、その結果 BNP 内で、ハルタルはむしろ有権者の野党離れを招くと見方が広がってきたことによる。BNP は、反アワミ連盟を唯一の共通項とし、様々な主義主張を抱え込んだ寄り合い所帯であるが、中でも街頭行動により政府退陣を促そうとする強硬派と、現政府の国家運営の失敗を国会内外で追求していくことを通じて、次期総選挙での返り咲きを目指す穏健派という二つの勢力の対立が存在する。これまで、国民

党やジャマティと足並みを揃えた野党連合の街頭行動の連絡調整に当たってきたのは、前者のグループである。しかし、街頭行動の限界が現れるにつけ、党内における後者の発言力が増し、それが、1 年以内に迫った選挙に的を絞った運動への転向に反映されていると見られる。

3) ハシナ政権の任期は、2001 年 7 月 13 日に満了するが、野党側は、現政権が任期を全うすることを阻止すべく、かねてより前倒し選挙実施を強く求めてきた。しかし、ハルタル主体の反政府運動が奏功しないまま、政権の任期は残り半年となり、現段階では、野党の圧力が選挙の早期実施を促す要素になる可能性は低く、選挙の時期決定は、与党、特にハシナ首相の一存にかかっていると見られる。一般的見方として、(i) 3 月の独立記念日直後に国会解散、そして本格的な雨期開始以前の 6 月、乃至は(ii) 任期満了後 9～10 月に実施、という二通りの予想がある。ハシナ首相自身は、選挙の時期について具体的な言質を与えることを避けているが、与党の中では任期満了後総選挙の声が大勢を占めると言われる。また、政権交替のタイミングに係る重要な要因として、故ムジブル・ラーマン大統領暗殺裁判の行方がある。同裁判は、1998 年 11 月に地方裁判所での有罪（死刑）判決後、高裁に持ち込まれたが、上級裁判所でも有罪は固く、3 月頃までには最高裁控訴部で刑が確定され、刑の執行が行われると見られていた。しかし、昨年 12 月 14 日の高裁判決で、二人の判事の意見が割れ、新たに第 3 の判事の裁定に委ねられることになり、裁判は当初の予定よりも長引く見通しが出てきた。右裁判はハシナ首相にとっては悲願とも言え、刑の執行を果たす以前に、現政府が政権を手放すことはあり得ない。その結果、任期満了後の総選挙という可能性がより現実味を帯びてきたが、現地ジャーナリストらの見解は、ハシナ首相が極めて老獪な政治家であり、予想を裏切る前倒し選挙実施の可能性も否定し得ないという点で一致している。いずれにせよ、与野党共に中央選挙事務所を開設し、両党首以下議員等が選挙区詣でを開始する等、実質的な選挙戦の火蓋は既に切られている。

4) 前回 1996 年 6 月の総選挙では、アワミ連盟は 146 議席、BNP は 116 議席と獲得議席数では差が開いたものの、得票率で見る限り、約 38 パーセント対約 33 パーセントと、両者の支持率に圧倒的な格差はなかった。その事実に基づき、野党側は選挙協力という戦術を打ち出した。ただし、選挙協力は BNP にとっては、諸刃の剣である。国民党やジャマティは、1999 年末に、初めて 4 野党の首脳が一同に会した大集会が開催された頃から、選挙協力の実施を BNP に対して迫ってきた。それに対し、BNP 側は、選挙協力は行うと約束したものの、そ

の具体化を避けてきた。なぜなら、実際に選挙協力を行うならば、BNP と他の3 野党の勢力差からいって、BNP 側が相当程度の議席を他野党に譲らざるを得ず、その結果、党内の反発を招く恐れが多分にあるためである。BNP の首脳部は、あくまで対外的には選挙協力という姿勢を崩さないが、同時に単独過半数獲得を目指し、各選挙区の同党候補者の選定を慎重に進めている。

野党の協力体制のもう一つの不安要素は、国民党エルシャド総裁の逮捕である。同総裁は、大統領の座にいた当時の汚職贈賄容疑で複数の刑事訴追に直面しているが、その一つに関し、11 月最高裁控訴部が高裁の有罪判決（8 月）を支持して、上告を却下する判断を示した。「バ」の憲法は、2 年以上の懲役を含む有罪判決を受けたものに対し、刑期満了後 5 年間は国会議員となる資格を停止している。現在、エルシャド総裁は、5500 万タカの罰金を支払う迄との条件で、ダッカ中央刑務所に収監されている。前回の総選挙で 33 議席を獲得した国民党は、その後内部対立により勢力を縮小したものの、今なお第 3 の勢力として、アワミ連盟と BNP の勢力均衡を崩す重要な位置にいる。しかし、同党の人気は、エルシャドの個人的リーダーシップに負うところが大きく、同総裁エルシャドを欠いた選挙戦は苦しい戦いを強いられることになろう。

5) 一方、与党ことっての最大の課題は治安の改善である。警察の記録によれば、昨年 1 月から 9 ヶ月間の殺人件数は 2294 件に上った。平均すれば、1 日当たり 8 人以上が殺されていることになる。同じ報告によれば、前年同時期は 2814 人であったので、必ずしも年々殺人が増加していると言い切ることはできない。しかし、日々凄惨な写真入りで、新聞紙面を飾る犯罪事件の数は、国民の中に治安への懸念を強めるには充分である。また、野党支持者の逮捕や、誘拐、殺害等の事件とともに、与党指導者および、家族による超法規的な犯罪行為はマスコミを通じてよく知られている。治安改善の目的で制定された公安法も、野党関係者に対してのみ適用されているという野党の批判も、あながち事実無根ではない。

「バ」の国会選挙は、第 13 次憲法改正に基づき、選挙管理内閣により実施される。これは、過去において選挙が時の政権により恣意的に操作されてきたことに対する反省にも基づき、1996 年 6 月の総選挙の際、実質的に与野党の合意のもとに編み出された「バ」の民主主義確保のための装置である。次期総選挙が迫りつつある現在、野党側は、自由、公正な選挙実施のためには、選挙管理内閣の成立のみでは充分にあらず、選挙管理委員会の再編や、選挙の遂行に携

わる地方官僚・警察の人事異動など、行政、警察機構における与党の影響力を可能な限り排除することが必要であると主張している。上記の治安問題との関連で言えば、現政府が選挙管理内閣に政権を委譲した時点で、これまで弾圧されてきた野党支持者の報復が爆発し、それを導火線に治安の一層の悪化を懸念する声が、野党指導部の中から出されている。

6) 次期総選挙は、BNP とアワミ連盟両方の政権を経験した 10 年を踏まえて迎える選挙である。大方の見方では、野党の選挙協力が成立しない限り、与党優勢と言われるが、現時点では、両方の側に未知の材料が多く、事態は予断を許さない。

(2) 外　交

現政権の対外政策の柱は、国連を中心とした国際舞台での積極的な貢献と、SAARC、BIMSTEC 等の地域協力機構および二国間関係を通じた経済関係強化から成っている。「バ」は、外交面で NAM、SAARC、英連邦、OIC、D8 のメンバーであると同時に、LDC のオピニオン・リーダーを自任しており、九州．沖縄サミットにおいても、ハシナ首相が LDC を代表する形で議長の森首相宛に、サミットにおける LDC の取り扱いに関する書簡を発出している。また、国連の場においても、2000 年 1 月より 2 年間の任期で国連安保理非常任理事国を務めている。また PKO への要員派遣は世界第 4 位に位置するなど、積極的な人的貢献を行っている。

過去 4 年半の任期中、現政権は親インド的な立場を利用して、ガンジス河川水配分協定締結（1996 年 12 月）、チッタゴン丘陵地帯和平協定の締結（1997 年 12 月）などの成果を挙げてきた。特に後者の関連で、ハシナ首相は 1999 年 9 月ユネスコ平和賞を受賞した。また、同年 9 月にはアジアの国会議員による平和協力会議を開催し、国連においては「平和の文化」宣言採択に向けイニシアティブを取る等、国際場裏において平和をキーワードとする国家イメージの形成にも努力している。2000 年 3 月 8 日には、南アジア諸国の中で最初に CTBT を批准した。

2000 年 3 月 20 日には現役米国大統領としては初めて、クリントン大統領が南西アジア歴訪の一環として「バ」を訪問したが、これは国際社会における「バ」の地位上昇を端的に象徴するものとして、受け止められた。また、同年 8 月の森総理の訪問は、日本の現役総理の訪「バ」としては海部総理（当時）以来、10 年振りとなり、西の大国（米）に続く東の大国の訪問として、「ハ」政権にとり大きな外交得点となった。

他方、パキスタンとの関係は若干微妙な局面にある。2000年9月の国連安保理サミットにて、ハシナ首相が軍事政権に対し批判めいた演説を行ったとして、ムシャラフ行政長官が予定されていた「バ」・「パ」首脳会談を、一方的に急遽キャンセルしたことを始め、同年12月には当地パキスタン大使館次席がダッカ市内で開かれたシンポジウムにて、「71年の独立戦争はアワミ連盟内の不穏分子が誘発した」と発言したことに反発し、「バ」政府は「バ」では初めてとなったペルソナ・ノングラータを通達し、同外交官を国外退去とした。

(3) 経　　済

1) バングラデシュは人口1億2800万人以上を抱える世界最大規模の最貧国であり、一人当たりのGDPが357ドルと極めて貧しい状況に置かれている。経済の基盤は農業であり、GDPの25.3%、雇用人口の63.2%を占めており、とりわけ稲作が最大の経済活動である。農業生産は天候条件に大きく依存しているため、卓魃や洪水のある年は食料輸入が必要となり、これが国際収支を悪化させる原因になっている。製造業は、GDPの18.0%、雇用人口の7.7%を占めており、縫製品、ニットウェア、食品加工、皮革製品、ジュート製品など、低賃金を武器にした労働集約型産業が大半を占めている。その他に、建設業が、GDPの7.7%、雇用人口の1.8%を占め、サービス業が、GDPの49.0%、雇用人口の27.3%を占有している。

バングラデシュ経済構造（GDP、雇用人口）（1999年）

	農業	製造業	建設業	サービス業	全体
GDP	25.3%	18.0%	7.7%	49.0%	100%
雇用人口	63.2%	7.7%	1.8%	27.3%	100%

出所：バングラデシュ統計局資料

2) バングラデシュは1992年以降、年平均4.8%の経済成長を達成した。これは、前政権以来、導入されている経済自由化政策が大きく寄与している。1981年より導入されている世銀・IMFの構造調整政策も前政権より本格化し、財政、金融、貿易部門の改革、公的部門の合理化、民間部門の活性化、規制緩和、海外直接投資の促進などが実施されてきた。その結果、インフレ率、財政赤字、外貨準備高など、マクロ経済安定に比較的成功しており、縫製品、ニットウェアなどを始めとした製造業、建設業、エビを中心とした漁業が高い成長率を記録した。1997年以降のアジア通貨危機の影響も、対東南アジア地域向け輸出が小さいため、最小限に食い止めること

に成功し、1999／2000 年度の経済成長率は 5.5％が見込まれている。しかし、世銀によれば、人口増加率などを考慮すると、4～5％台の経済成長率は貧困克服のために十分でなく、最低 8％以上の経済成長が継続的に必要と指摘している。

バングラデシュ GDP 成長率（1992／93～1999／2000 年度）

	92／93	93／94	94／95	95／96	96／97	97／98	98／99	99／00*
GDP	4.6％	4.1％	4.9％	4.6％	5.4％	5.2％	4.9％	5.5％

出所：バングラデシュ統計局
注：＊推定値

3) バングラデシュの貿易構造は、1980 年代半ば以降、ジュート・同製品、茶などの伝統的輸出産品に代わり、縫製品、ニットウェア、冷凍食品、皮革製品などの非伝統産品の輸出が急激に伸びており、これらの輸出のシェアは 85％までに達している。輸入は、繊維・同製品、機械・輸送機器、石油・同製品などが主となっている。貿易相手国として、輸出先は、米国、ドイツ、英国、フランス、イタリアなどの欧米諸国が輸出全体の 79％を占めるに至っている。輸入は、インド、中国、日本、香港、韓国などのアジア諸国が主な輸入先となっている。

主要品目類別輸出入（1997 年度）

（単位：100 万ドル、％）

輸出（FOB）	金額	構成比	輸入（CIF）	金額	構成比
縫製品	2,843	55.1	繊維・同製品	1,846	33.2
ニットウェア	940	18.2	機械・輸送機器	568	10.2
冷凍食品	294	5.7	鉱物	548	9.9
ジュート・同製品	281	5.5	農業品	491	8.8
原皮・皮革製品	190	3.7	化学品	450	8.1

出所：日本貿易振興会

主要国別輸出入（1997 年度）

（単位：100 万ドル、％）

輸出（FOB）	金額	構成比	輸入（CIF）	金額	構成比
米国	1,357	33.3	インド	796	11.6
ドイツ	387	9.5	中国	622	9.1
英国	363	8.9	日本	472	6.9
フランス	270	6.6	香港	431	6.3
イタリア	215	5.3	韓国	379	5.5

出所：日本貿易振興会

4) 現政権の経済政策は、(i) 経済自由化の一層の促進、(ii) 民間活力の有効活用、(iii) 海外直接投資の誘致促進、(iv) 農村開発を柱としている。このための施策として、中小企業・農業関連企業・輸出産業の振興、海外直接投資誘致のための環境整備、国営企業の民営化促進などを挙げている。海外直接投資に関しては、既存の輸出加工区（EPZ）の拡張、EPZ の新設、民間による EPZ の設置を認める法案を制定した。また、電力・ガスなどのエネルギー部門への外資導入を積極的に進めており、1997 年には大規模な天然ガス・油田探索の国際入札を実施した。

5) バングラデシが持続的な経済発展を達成するためには、各分野において抜本的な構造改革に取り組む必要がある。具体的な政策として、(i) 道路、港湾、通信、エネルギーなどの経済インフラの強化、(ii) 教育、保健．衛生などの改善を通じた人的資源の開発、(iii) 金融制度の基盤の強化、(iv) 農業部門の生産性の向上、(v) 輸出産業の育成、(vi) 海外直接投資の誘致、(vii) 公的部門の効率化などが、今後の経済発展の鍵を握っていると考えられる。

6) バングラデシュ経済にとって、国内市場を拡大させること、つまり・中間購買層の人口を増加させることが重要である。バングラデシュは農業部門に大きく依存しており、全雇用の 6 割以上を占めることから、農業生産性の向上による家計所得の増加が不可欠となる。しかし、農業部門は天候に左右され易く、雇用の吸収も限界にきていることから、同部門の代わりに雇用を吸収し、外貨を獲得し、経済成長を牽引する部門として、労働集約型の製造業の振興が重要である。しかし、現在の主力製造業である縫製品およびニットウェア産業は、原材料を輸入に頼っているため付加価値が低く、また、2005 年の多国間繊維協定（MFA）のクォーター（輸出割当枠）廃止後には、国際競争力が低下することが予想されることから、川上分野に当たる繊維産業を育成することによりコストダウンを図り、同時に、国際市場基準を満たすために、輸出商品の品質向上および多様化などが急務の課題となっている。さらに、外貨獲得源を分散化させる観点からも、次の世代を見据えて、他の育児産業を中長期的に育成し、それを支える投資環境を整えることが、バングラデシュ政府に課された重要課題であると考える。

7) 天然ガスはバングラデシュ唯一の天然資源であり、国内外から最も注目されている分野である。バングラデシュ政府は、天然ガス供給を速やかに増

加させるために、1990 年代に外資導入政策を取り、海域を含めたバングラデシュ全土を 23 区に分割し、天然ガス採掘権のための国際入札を行った。その結果、欧米系の石油メジャーがほとんどの鉱区を独占している。天然ガス埋蔵量に関し、現在、30 兆立方フィートの埋蔵量が確認されており、そのうち 13 兆立方フィートが採掘可能である。商業エネルギー国内消費構造（1995 年）は、天然ガス（77.6%）、石油（22.0%）および、水力（0.4%）であり、天然ガスの消費は増加傾向にある。天然ガスの利用（1997 年）に関しては、発電用（43%）、肥料生産用（31%）、化学工業用（11%）、家庭用（8%）および、ロス（7%）となっている。現在、天然ガスの輸出は禁止されているが、貴重な外貨獲得源になることから、近い将来に輸出解禁されることが望まれる。また、天然ガスを原料とした発電や肥料製造業の振興も、天然ガスの有効利用を促進する意味から重要である。

(4) 日本・バングラデシュ経済関係

1) 日本とバングラデシュの経済関係は、経済協力分野と比較するとかなり低水準で推移している。例えば、貿易シェアに関し、近年、欧米諸国およびアジア諸国が対バングラデシュ貿易額を伸ばしているのに対し、日本の貿易シェアは 1986／87 年度の 13.3%から 1998／99 年度の 4.4%まで落ち込んでいる。これの要因の一つに、日本からの直接投資および日本への輸出が低迷していることが挙げられる。そのため、日本からの直接投資誘致を促進すると共に、欧米諸国以上に品質基準が厳しいと言われている日本市場に参入できるように、品質管理の改善および商品の多様化が不可避であろう。

2) 両国間の貿易に関し、日本は輸出先として欧米諸国に続き第 9 位、輸入先としてはインド、中国に続き第 3 位の地位を占めている。1998 年の日本の対バングラデシュ輸出は約 421 億円で前年度比 9%の増加であり、他方、輸入は約 149 億円で同 5%の減少となった。貿易収支は、約 272 億円の日本の輸出超過であり、バングラデシュの対日赤字の恒常化が一つの問題となっている。商品別に見ると、輸出では鉄鋼一次産品、乗用車、繊維用機械ミシン、有線通信機器・同部品が主であり、輸入では冷凍エビ、縫製品・ニットウェア、ジュート製品、履物が主な取引商品となっている。

日本－バングラデシュ貿易（1991－1998年）

（単位：百万円）

	1991	1992	1993	1994	1995	1996	1997	1998
日本の輸出	32,649	30,366	36,065	34,230	32,633	37,658	38,541	42,116
日本の輸入	8,919	7,845	8,209	9,265	13,676	15,623	15,690	14,906
貿易収支	23,730	22,521	27,856	24,965	18,957	22,035	22,851	27,210

出所：大蔵省通関統計

主要商品別輸出入（1999年）

（単位：百万ドル）

日本の輸出商品	金額	日本の輸入商品	金額
鉄鋼一次産品	79.4	シュリンプ・プローン	44.5
乗用車	27.7	衣類・同付属品（ニット）	17.9
繊維用機械ミシン	19.0	ジュート・紡織用繊維織物	12.0
有線通信機器・同部品	18.4	履物	11.3
プラスチック	11.8	皮革製品	10.2
トラック	11.4	繊維二次製品（除衣類・同付属品）	8.9

出所：日本貿易振興会

3) 日本からの対バングラデシュ直接投資は、増加傾向にあるものの、金額的には小規模である。日本からの輸出加工区（EPZ）外の投資累計件数および金額（登録ベース）は、89件で8億1100万ドルであり、米国、マレーシア、英国に続き第4位である。他方、EPZへの投資累計件数および金額は（登録ベース）は、26件で5890万ドルであり、韓国に続いて第2位を占めている。業種別に見ると、肥料製造を中心とした化学分野が、日本からの1951年－1998年度累計投資額の55％を占めており、続いて輸送機（22％）、水産業（6％）、繊維（6％）となっている。日本の最大投資は、3950万ドルのカフコ・プロジェクトで、これは天然ガスを原料とした肥料製造会社であり、バングラデシュ最大の民間投資、外貨獲得案件および、外国合弁案件として始まったプロジェクトである。

日本の業種別投資（1951－98年度累計、稼動ベース）

（単位：億円）

業種	化学	輸送機	水産業	繊維	鉄鋼	機械	運輸業	合計
件数	6	13	6	9	4	3	6	52
金額	126.1	50.9	14.4	13.8	5.5	5.4	4.1	228.3

出所：日本貿易振興会

1-3　我が国からの援助状況

(1) バングラデシュに対する主要援助国・機関は日本、米国、独、IDA、ADB 等であり、我が国は従来より二国間援助における最大のドナー。

(2) 我が国は、バングラデシュが後発開発途上国（LLDC）であり開発ニーズが高いこと、我が国との伝統的友好関係等に照らし積極的に援助を実施。1998 年の我が国二国間援助実績では、当国は第 9 位の受取国。
援助の実施分野としては、我が国とバングラデシュの間の経済協力年次協議の成果や当国経済政策の重点分野を踏まえ、農業農村開発、保健医療等の基礎生活分野、人的資源開発、洪水対策、投資促進・輸出振興のための基盤整備等を中心に協力を推進。特に今後は人口・保健分野と洪水対策を含む環境に配慮していくこととしている。

〔無償資金協力〕

バングラデシュは、我が国の無償資金協力の最重点対象国の一つで、1999 年度末迄の累積供与額は、約 3,770 億円。また、当国は 1984 年度以来我が国無償資金協力の最大の受取国。

当国に対する無償資金協力としては、灌漑排水施設等の農業・農村開発分野、飲料水供給等の基礎生活分野、教育訓練等の人造り分野等を基本として供与を実施すると共に、当国が LLDC であることにも鑑み、橋梁等の基礎インフラ分野についても供与対象としているが、最近は債務救済無償の供与額が大幅に拡大。なお、過去無償資金協力により実施された案件のうち、当国最大の幹線国道である、ダッカ・チッタゴン道路にかかるメグナ橋（1990 年開通）およびメグナ・グムティ橋（1994 年開通）は、日バ友好のシンボルとして特に内外より高い評価を受けている。

また、1989 年より実施している草の根無償資金協力は、当国の最貧困層を対象として、保健・教育・ WID 等の分野を中心に NGO の活動を効果的に支援しており、近年以下の通り着実な伸びを見せている。

平成 7 年度	54,747,308 円
8 年度	76,128,122 円
9 年度	77,675,366 円
10 年度	93,911,008 円
11 年度	123,375,480 円

1999 年度の対バングラデシュ無償資金協力については、多目的サイクロン・シェルター建設計画を始めとする一般無償、食糧援助、債務救済無償等に対して総額約 272 億円を供与。1999 年度の供与実績は以下の通り（交換公文ベース）。

（単位：億円）

案 件 名	供与限度額
1. 多目的サイクロン・シェルター建設計画	8.52
2. 新生児破傷風はしか予防接種拡大計画	0.89
3. ポリオ撲滅計画	5.37
4. ヨード欠乏症対策計画	2.75
5. 食糧援助	8.50
6. 草の根無償	1.23
7 債務救済	245.11
合 計	272.37

〔有償資金協力〕

我が国は従来より当国の資金ニーズおよび我が国との友好関係に鑑み、円借款を供与、1998 年度迄の累計実績は 5608.5 億円（交換公文ベース）。分野としては従来商品借款等が多かったが、最近では経済・社会インフラ等の分野での案件が増加。当国の LLDC たる地位に鑑み、当国に対する経済協力は今後無償資金協力と技術協力を中心とするも、円借款についてもケースバイケースで引続き供与を検討することとしている。

1998 年度の供与実績は以下の通り。

（単位：億円）

案 件 名	供与限度額
1. 北部農村インフラ整備事業	65.93
2. 配電網拡充および効率化事業	43.76
3. ゴラサール肥料工場改修事業（2）	54.43
合 計	164.12

1999 年度の供与予定は以下の通り。

（単位：億円）

案 件 名	供与限度額
1. ルプシャ橋建設事業	83.00
2. 大ファリドプール農村インフラ整備事業	40.55
3. 農村電化事業（V－B）	14.60
4. カプタイ水力発電所 6、7 号機拡張計	21.96
合 計	160.11

〔技術協力〕

実施中の代表的なプロジェクトは、鶏の飼育技術の改良により農村部の貧困層の所得向上を図る「家禽管理技術改良計画」、当国第 2 の都市であるチッタゴン市の「モハラ浄水場拡張計画調査」、母子保健サービスの向上と人材育成を目的とする「リプロダクティブヘルス人材開発プロジェクト」、南西部地域のヒ素汚染対策として代替水源の調査を行う「ヒ素汚染地域地下水開発計画」等がある。

従来プロジェクトベースで比較的短期間派遣してきた専門家に加え、各省庁の計画部門への政策アドバイザー型専門家派遣を積極的に推進し、現在 14 名の個別長期専門家、9 名のプロジェクト方式技術協力長期専門家が活動中である。

(参考)

(1) 我が国の ODA 実績（支出純額、単位：百万ドル）

年次	無償資金協力	技術協力	計	政府貸付 (支出純額)	合計
91	122.41	21.11	144.51	-29.53	114.98
92	163.59	28.41	192.07	-28.63	166.44
93	207.51	34.01	241.52	-56.48	185.04
94	204.71	35.93	240.65	-13.05	227.60
95	228.75	34.84	263.58	-8.69	254.89
96	184.77	30.52	215.28	-41.25	174.03
97	169.60	26.83	196.44	-66.45	129.98
98	216.35	22.83	239.19	-50.14	189.05

(2) DAC 諸国・国際機関の ODA 実績（支出純額、単位：百万ドル）

年次	1991 年	1992 年	1993 年	1994 年	1995 年	1996 年	1997 年
日本	115.0	163.4	185.0	227.6	254.9	174.0	130.0
米国	129.0	130.0	94.0	152.0	56.0	41.0	
ドイツ	97.4	79.1	75.2	104.9	61.5	84.0	47.3
英国	97.9	102.1	71.7	65.7	76.0	71.4	70.3
カナダ	94.6	108.9	41.3	53.7	38.0	37.5	52.4
世界銀行	239.0	307.2	277.6	379.5	155.3	229.1	245.1
アジア開発銀行	268.0	319.7	217.9	358.1	248.6	263.2	149.1

（出典：“最近のバングラデシュ情勢”在バングラデシュ国日本大使館）

1-4　農業の現状

バングラデシュ国においては、労働人口の 2／3、GDP の 1／3 を農業が占めている。国土面積 14.4 万 km^2（1,440 万 ha）、このうち耕地は 969 万 ha（国土の 67.3%）、牧草地 60 万 ha（4.2%）、森林地 190 万 ha（13.2%）、その他 82 万 ha である。農業従事者は 3,657 万人、農業従事者 1 人当たりの農地は 0.3ha である。

主農産物はジュート・米・茶である。穀物は高い人口増加率や自然災害などで慢性的に不足しており、毎年 100 万 t 以、上を輸入し、経済は苦しい状況にある。GDP 成長率は 1995 年度 4.7%。消費者物価上昇率は 1995 年度 5.2%。貿易は大幅入超。海外の出稼ぎ労働者の送金と外国援助に頼る（開発計画財源の 6 割は外国援助）。そのため税制改革、規制緩和、国営企業民営化などの経済改革を推進中で、1995 年の対外債務残高は 169 億ドルである。

1.5　第 5 次 5 ヶ年計画（1997～2002）

バングラデシュ国の農業は、この国の経済の成長および安定にとって重要な役割を演じている。前述したように GDP の 1／3、労働人口の 2／3 を占めている。また、1996～97 年において、主要農産物の輸出量は 12%、ジュートや皮革製造も含めると 24%を占めることになる。

近年、高収量を持続可能にし、かつ環境を保護することが考慮されねばならなくなった。不適切な化学肥料の使用、水不足が大きな問題になってきた。従来の稲の収量は平均して 2 ton／ha であるが、種々の研究により HYV の稲作の収量は、4 ton／ha の可能性が明らかになった（資料-28、Table-2）。

5 ヶ年計画の主な目的は次の通りである。

1) 持続可能を目的として農村地域において、農産物の増収および農民の収入の増収を図る。
2) 穀物および他の農産物の自給達成を図る。
3) 農産物、特に野菜、果実の自給および輸出の促進を図る。
4) 畑地、水田および海岸地帯において、近代的な農作業の採用および促進を図る。
5) 効率的で均衡のとれた土地、水およびその他資源の活用により、持続可能な農業の確立を図る。
6) 比較的大規模な農場および農家に対し、企業的な農業が可能になるように誘導する。

第２章　農業開発の現状と問題点

第２章　農業開発の現状と問題点

2-1　概　　要

農業依存経済において、バングラデシュ国の農業の最も重要な点は．農産物の生産性において、持続性のある成長である。穀物の需要供給は，成長率 4％を目指している。2000 年までに 2,500 万 ton、2010 年までに 3,000 万 ton の生産を目指している。この目標を実現することは多くの問題を抱えている。このためには、第 1 に作物の生産性の成長を加速し、持続することが必要である。この国においては、旱伐と洪水の被害が大きな障害となっている。このために楼観・排水および洪水対策のため施設が重要である。さらに、病虫害の防除、優良種子の確保、肥料、土壌管理の改善が必要である。

第２の点は、作物の多様性である。現在、作物の 75％は米であり、次に小麦はわずか 4％である。残りの 21％が他の作物を栽培している。作物の多様性の利点はよく知られているが、農民の収入の増加、栄養バランス、アグロ・インダストリー、灌漑水の節減および灌漑面積の増加、等々多くの利点があげられる。

第 3 の点は、環境の保全である。すでに作物および土壌管理の不適切から、農地が劣化現象を呈している。ある科学者の調査によると、32％の農地が塩害の被害をうけている。12％が土壌浸食の被害をうけている。また、耕作地の半分以上が不適切な排水施設によって、湛水被害を生じている。地下水の利用によって、地下水位が低下し、浅井戸では取水することができなくなってきた。特に海岸地帯では，地下水位が低下することにより、塩水が侵入し、地下水が汚染され、水質が劣化してきた。

第４に、貧困の緩和、栄養失調、食糧確保の問題である。バングラデシュ国においては、5,000 万人の人口が貧困層に属している。貧困層は非農民層よりも農民層に多く存在している。農業の成長を持続し、かつ加速するためには、食糧を購入できるようにすることである。

バングラデシュ国において、持続性のある農業にするための優先度は、次の通りである。

1)　高い潜在力のある農地の改善
2)　低い潜在力の地域の保全および改善
3)　健全な土地／人の比率の改善

2-2　農業生産

大半の耕地はずでな耕作されている。将来の人口増加はすでに小農経営をさらに細分化することが考えられる。農業は GDP の大部分を維持しなければならない。高い生産性を確保するためには、既存の生産システムの生産性を高める以外には方法はない。過去 25 年間、バングラデシュ国は、米、ジュート、ポテト、シュガーケンにおいて新しいバライティを採用して、着実に発展してきた。1994～96 年において、稲作は 50.3％を高収量の品種（MVs）を用いて、1970～71 年において 4.7％の増収を可能にした。最も大きな問題は、新品種の収量の減少である。1970～71 年に 3.27ton／ha が 1994～95 年には 2.41ton／ha に下降した。この原因は、第 1 には MVs に適さない地域にまで及んだことである。

第 2 は、他のアジアの諸国に比較しても、使用する肥料の量が少ないことである。

第 3 は、新品種の稲は、病虫害に弱いことである。

第 4 は、灌漑施設の管理および運営が適切でないこと。

第 5 は、作物の研究および普及が農民までにいたらなかったことである。

2-3　灌漑排水

灌漑面積の拡大は、バングラデシュ国政府の戦略の中でも、穀物を増産する観点からも最も重要な対策である。灌漑面積は過去 10 年間に著しく増加した。1994～95 年の灌漑面積は、304 万 ha、すなわち、潜在灌漑面積、712 万 ha の 42％に相当する。小規模灌漑は、1972 年から 82 年に 136 万 ha から、1994～95 年に 287 万 ha に増加した（Table-3 参照）。

このことは、モースン依存農業から水源の安定した灌漑農業に移行したためであるが、この成長は必ずしも、堅実なものではない。政府の政策の変更、価格の変動、特に湾岸戦争による燃料費の上昇等々、多くの問題を抱えている。

1994～95 年において、灌漑面棲の合計は 752.7 万 ha うち、地下水による灌漑面積は、618.4 万 11a、表流水による灌漑面積は、234.3 万 11a である（Table-3 参照）。バングラデシュ国南部および北東部においては、灌漑面積を拡大させるに必要な潜在的な表流水が存在する。

Flood Control and Drainage（FCD）、Flood Control, Drainage and Irrigation（FCDI）計画は、水開発省（Bangladesh Water Development Board （BWDB）によって運営されているが、各国の協力を得ているにもかかわらず、際立った成功はおさめていない。

2-4　市場、流通システム

バングラデシュ国農業の開発において、マーケントシステムは極めて弱い立場にある。経済の自由化、民営化において政府は、重要な役割を果たしていない。この市場を担当している農業市場部は、農業省の中でも最も弱小な部局である。

過去 20 年間、穀物（米、小麦）の実勢価格は下降している。その理由は、貿易および為替の自由化に伴ない米価は、国際市場価格に連動することになったためである。このため、消費者の家計は米価に大きく依存しているため、益々苦しくなっている。

2-5　農産物加工

バングラデシュ国では、季節によって腐敗しやすい農産物の過剰の状態を生じることが多い。農産物加工施設の発展は、ポスト・ハーベストの損失を防ぎ、農家の収入を増やす役割を演ずることになる。しかしながら、現在、農産物加工業は初期の段階にある。貯蔵、加工、包装の方法が標準化されず、極めて遅れた状況下にある。

バングラデシュ国における食料加工業に対する政策は 1991 年新工業政策の一部として認定されたが、ほとんど機能されていない。

2-6　農村開発

農村開発は、農業の成長にとって極めて密接な関係にある。道路や水路の交通ネットワークは農業生産性の向上に大いに寄与する。

インフラ整備は、土地なし農民や貧農に対し雇用の機会を与える役割もある。特に、灌漑開発や農村電化、交通網の整備は貧困の解消に役立つことになる。

2-7　開発における女性の役割

バングラデシュ国における女性の労働力の占める割合は 43%（1989 年）を占めている。農業においては特に大きな役割を占めている。しかしながら、生活環境の点では男性より劣悪な状況下にある。各種 NGO の団体が女性の役割の拡大に努力しており、かなり成功をおさめているが、問題は多い。

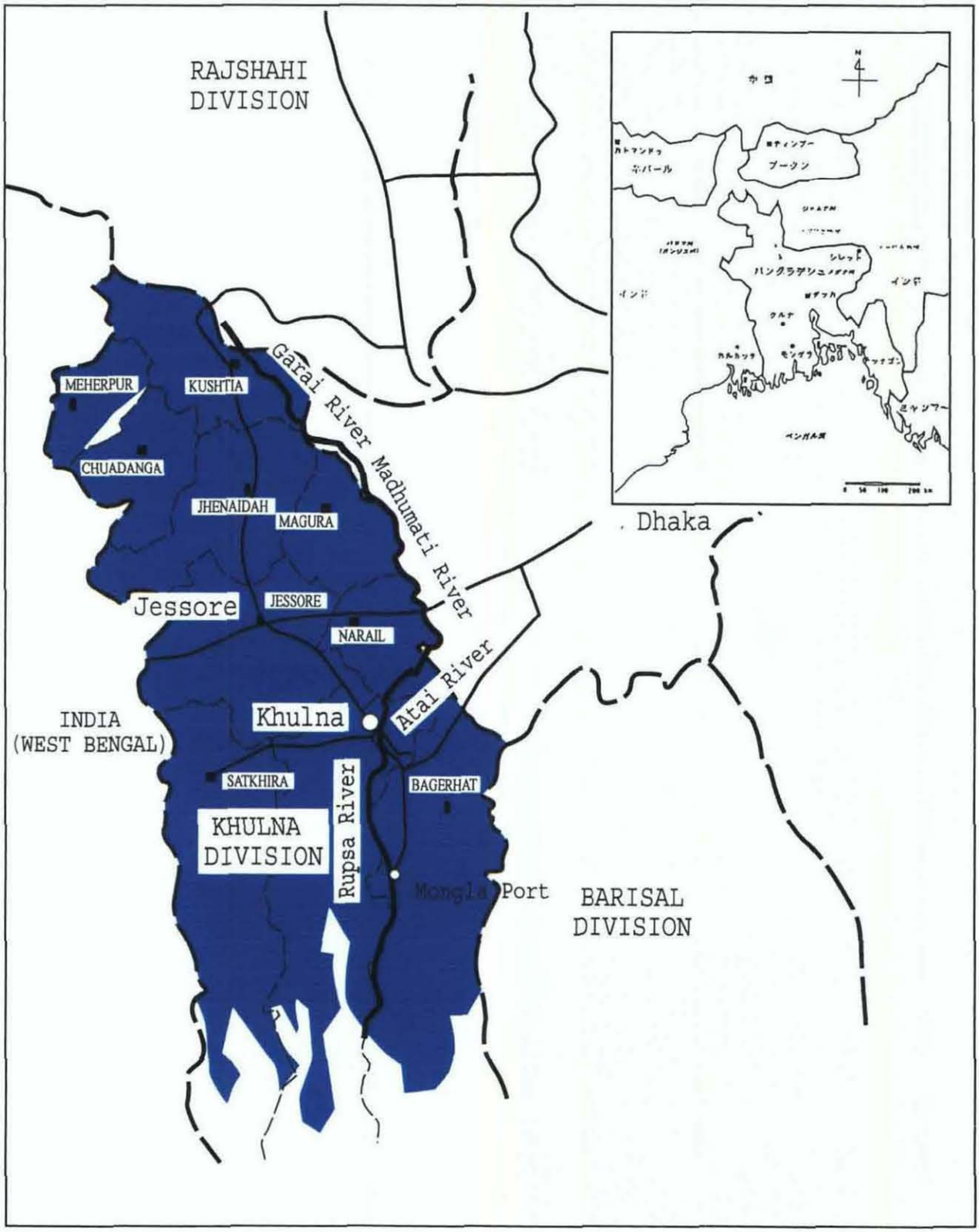
2-8　農地改革および農地の利用

農村の貧困層の 2／3 は土地なし農民である。上位 10%の農家が 51%の農地を保有し、低辺の 40%の農家が 2%の農地を保有しているにすぎない。人口 1 人当たりの耕作地面積は、0.064ha で、世界でも最も人口密度の高い国の 1 つである。農地の保有面積は、

均等に分けるという相続法によって細分化するとともに、人口の増加によって、住宅を建設するために農地がつぶされ、益々小規模化に拍車をかけている。現在の土地所有の上限は、3.37ha に抑えられているが、見るべき効果はない。

1984 年、農地改革法が小作人の保護のためと土地の細分化を防ぐために決定されたが、有効に働いていない。

第３章　クルナ地区農業持続可能開発計画（フォローアップ調査）



プロジェクト地域位置図

第３章　クルナ地区農業持続可能開発計画（フォローアップ調査）

3-1　地域の概況

クルナ地区は、バングラデシュ国の南西部に位置し、インド国のベルガル州に接している。北はプドマ（Ganger）河を境にして、ラジャシ（Rajshahi）地区と接し、東はバリサル（Barisal）地区と接している。密度の高いジャグルと多くの河川が過去、東西からの侵略に対して、自然の防御を形づくっていた。初期の移住が行われた後、忘れさられた状態にあったが、英国の侵出によって開発された。

今日でも、落目になっているジュート産業の中心地であり、経済の中心地でもある。水産業、特にえびの養殖は盛んである。国際港モングラ港（Mongla）より多くの生産物を船積みし、外国に輸出している。南部のサンダーバン地帯は、世界最大規模を有するマングローブ林である。

3-2　計画調査の基本的な考え方

現在の農業農村開発の問題点を整理し、将来に向けた対策を考える場合、農業全般にわたるマスタープランを策定することは極めて緊急の課題である。その対策としては次のことが考えられる。

1) 灌漑排水および洪水防御施設の更新、灌漑排水システムの合理化、近代的な水管理組合の再構築
2) 合理的な土地利用計画の策定
3) 農地改革を促進するための行政組織の再構築
4) 効率の良い農業市場システムの近代化
5) 農業支援システムの再構築
6) 小規模私有農家に対する農業資金システムの改善
7) 農業研究組織の再構築

(1) 目　的

この調査の目的は次のように考えられる

1) この地域における持続可能な農産物の生産強化のための総合的な農業農村総合開発計画の基本的な開発計画を策定し、バングラデシュ国側と協力して、開発計画の中に含まれる種々のプロジェクトの優先順位付けを行い、最優先プロジェクトの中からパイロットプロジェクトを選定する。

2) 選定された優先プロジェクトについて、フィージビリティレベルの調査を実施し、技術的、経済的、財務的可能性を明らかにし、すべての点で良好なものをパイロットプロジェクトとする。

3) 調査の過程において、カウンターパートに対し、技術移転を行う。

(2) 調査の対象地域

クアラ地区約 22,000km^2 を対象とする。

(3) マスタープラン調査

調査は Phase Ⅰ および Phase Ⅱ からなる。

1) マスタープラン調査（Phase Ⅰ）

この調査は調査地域の現況およびこの地域の開発を阻害している問題に対し、バングラデシュ国農業省および関係省庁と協力して持続可能な具体的な対策を作成し、農業農村開発のマスタープランを策定する。マスタープランの中の個々のプロジェクトの優先順位付けを行い、優先プロジェクトの中からパイロットプロジェクトを選定する。

このために、データ、情報をできるだけ収集し、分析を行うとともに、既存の開発計画をレビューし、問題点の解析およびその対策を作成する。その際、地域的条件別（気候、地形、標高など）および小セクター別（営農、畜産、普及、加工処理、マーケット、農業研究組織、農民組織、灌漑排水、洪水対策、農道、給水など）に問題点を整理、分析を行い、持続可能な具体的なプロジェクトを策定する。優先順位付けの基準はできるだけ客観的に設定する。速効性、効果的であり、バングラデシュ国全土のモデルになりうるものから選ぶことが必要である。

2) フィージビリティ調査（Phase Ⅱ）

1) の手順をふんで選定されたパイロットプロジェクトに対し、フィージビリティ・レベルの調査を実施する。この調査中、併行して次のような試験施設を設置する。この試験施設を設置することにより、具体的な施設を見せることにより、バングラデシュ国政府職員および関係農民を啓蒙することにも役立つこととなる。

- ふん尿を燃料として利用する試験施設、太陽エネルギーを利用してポンプ、農産物処理、加工などのための試験施設

（詳細は添付資料の Terms of Reference for the Study on the Sustainable Integrated Agricultural Development in Khulna Division を参照されたい。）

3-3　総合所見

農業生産体制の再構築にとって最も重要と思われる点は、農地の改革によって、土地なし農民をできるだけ少なくし、市場経済の中で如何にして自立していくかである。

今までの体制の中で経営意識の薄かった農家の意識を変えていくという問題も重要なファクターであるが、基本的には持続可能となるような農業生産整備が必要と考えられる。灌漑排水農業に必要な基幹施設はある程度存在するが、維持管理が不十分なため、利用効率はかなり低下している。これらの施設を更新し、有効に利用し、新たに構築する農業生産体制に組み込むことは緊急的課題である。生産体制の再構築には、ハードの分野として、ポンプ場、幹線灌漑排水施設以下末端に至る灌漑排水施設の整備、道路、ソフトの分野としては、集荷場、貯蔵・加工施設、農業研究組織の再構築、農民意識の改革、農業組合のおよび水管理組織の再組織化、流通機構等改善すべき点は多々あるが、農業開発を促進する上でここにあげたマスタープラン調査を行うことは極めて重要と考えられる。

〈技術的可能性〉

個々の技術についてはある程度の水準にあると考えられるが、今後、マスタープランのような全体計画を立てる上で外国の技術協力が必要となってくると思われる。基本的な建設技術、管理技術および研究の蓄積はある程度あるように感じられた。カウンタパートとしての相手国政府技術者の技術力に関してはプロジェクト遂行上、全く問題ない。

〈社会・経済的可能性〉

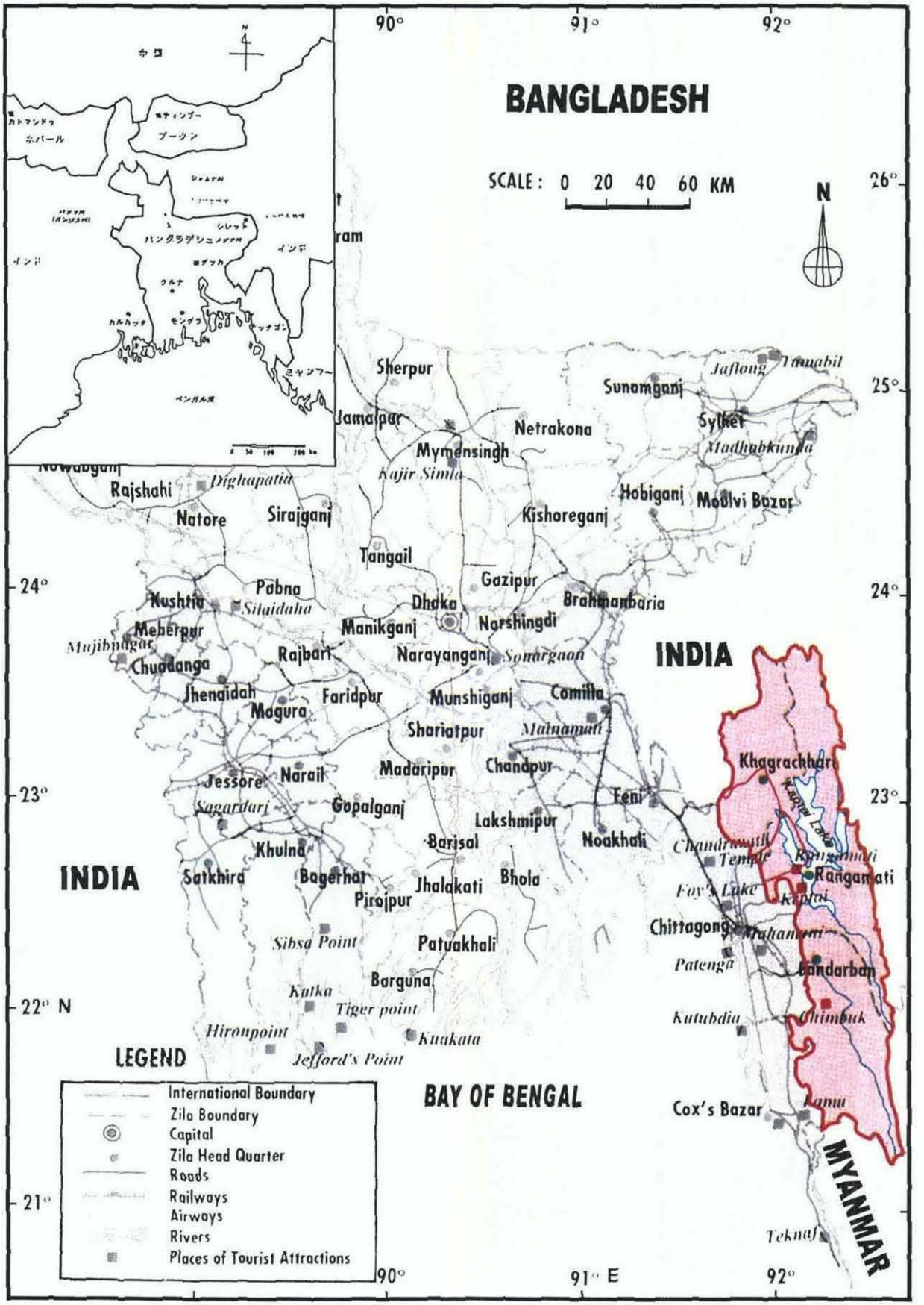
バングラデシュ国の農業部門は厳しい自然環境にあるが、伝統的な重要な生産部門で純生産で全部門の 1／3 および労働人口の 2／3 を占め、生産は停滞、むしろ穀物の生産は減退している。穀物自給率を向上させるためには、穀物栽培に適している地域に灌漑排水施設、洪水防止施設、土壌浸食防止施設の整備、農業支援体制の整備、特に、農地の改革が遅れているので、土地なし農民に土地を与える政策を促進することは主要穀物の増産を可能にするためには極めて緊急の課題で、バングラデシュ国農業にとって非常に大きな効果が期待される。

〈現地政府〉

当プロジェクトの担当の農業省農業普及局はバングラデシュ国政府内でも強力な組織の一つである。農業生産体制の改善は市場経済を活性化する上で極めて重要で、国家経済の安定には必須の課題である。

前回の調査後、添付資料にある TOR のドラフトを三菱商事経由で 1999 年 3 月に送付したが、今回の調査では、何等かの理由で農業省では入手されなかったようで、今回はとくに、この点を重視し再度 TOR のドラフトを提出し説明を行ったが、すぐに要請するとの確認を得た。

第４章　チッタゴン丘陵地域荒廃地回復計画



プロジェクト地域位置図

第４章　チッタゴン丘陵地域荒廃地回復計画

4-1　地域の概況

チッタゴン丘陵地域（CHT）はバングラデシュの南東に位置する丘陵地域で、ランガアマティ（Rangamati）、バンダルバン（Bandarban）、クガアルチヤリ（Khagachari）の 3 つの District からなり、その総面積は 13,295km^2 である。平地が地域の 5％以下を占め、ここでは定着農業が可能である。残りの 95％に相当する地域には樹木があり、畑地、アグロフォレストリー、および山林となっている。CHT は多種多様な動植物の生息地となっている。さらに少数民族が焼畑農業を営んでいる。現在約 4 万 ha の土地が、4、5 年のサークルで焼畑農業に利用されており、この状態は、土壌の肥沃度、生物多様性、および森林の回復を困難にし、結果として、CHT の全体的な生態系を徐々に悪化させている。

一方過去 20 年間において政府による平地からの定住計画や新たな出生により、CHT の人口は倍増し、130 万 ha の山地に 120 万人が住む状況となっている。これは既に CHT の収容能力を超えている。さらに、1974 年以来地域ではびこっている暴動により正常な経済開発行動が影響を受け、少数民族とベンガル人との間に民族的不信が増しており、これらの結果開発環境が損なわれている。

1997 年 12 月、バングラデシュ政府と少数民族代表との間で平和協定が結ばれ、ここに当該地域の開発環境が回復し、政府と地区住民の間には協調して当該地域の開発を推進する機運が熟している。

CHT 地域からの主要な輸出産品は、バナナ、パイナップル、ジャックフルーツなどの果物、木材その他の林産物である。CHT 地域の少数民族は、前世紀以来、林業を生業の基礎としている。CHT の森林は、現在乱開発や人口増加により大きく荒廃しており、この荒廃は地域社会や環境にもおよんでいる。1998 年以来、国や国際機関は同地域の持続可能な経済的・社会的開発を重視し、村落開発が実施され、同地域の 10 年開発計画が調査されている。また給排水プロジェクトが実施されている。

CHT 地域の農林業生産システムは、森林を基礎とした環境システムの回復によって強化することが可能である。このためには、特に社会林業、アグロフォレストリー、および営農システムの開発が必要となる。地域の貧民が森林部門への投資から生存のための持続的見返りを得るまでには 7～10 年を要する。したがって、森林や営農システムから短期的な持続的見返りを得る方法として、伝統的な土地利用に加えて、民族植物学や薬草の開発や商業的利用が検討されている。

CHT 地域の土壌、生物、および気候的条件は多種多様な植物種の栽培に適しており住民もまたこれらに通じている。本計画は、CHT 丘陵地域における現状の分析と開発ポテンシャルを検討し、適切な開発計画を立案するものである。

4-2　計画調査の基本的な考え方

チッタゴン丘陵地域の開発に対しては、最近、チッタゴン丘陵開発省が設置され、UNICEF、ADB などの国際機関と協力して多くの協力プロジェクトを策定しているが、実施に至っていないものが多い。

このため、この地域のマスタープランを策定し、各機関と協力して、実施のプライオリティを策定、プライオリティの高いプロジェクトから実施することが緊急の課題である。その対策としては次のことが考えられる。

1) 灌漑排水、洪水防御、土壌保全施設の更新および新設、灌漑排水システムの合理化。
2) 合理的な土地利用計画の策定。
3) 効率の良い農業市場システムの構築。
4) 農業支援システムの再構築。
5) 小規模私有農家に対する農業資金システムの改善
6) 丘陵地開発のための研究施設の再構築

(1) 目　的

この調査の目的は次のように考えられる

1) この地域における持続可能な農林生産物の生産強化のための総合的な農林業農村総合開発計画の基本的な開発計画を策定し、バングラデシュ国側と協力して、開発計画の中に含まれる種々のプロジェクトの優先順位付け行ない、最優先プロジェクトの中からパイロットプロジェクトを選定する。

2) 選定された優先プロジェクトについて、フィージビリティレベルの調査を実施し、技術的、経済的、財務的可能性を明らかにし、すべての点で良好なものをパイロットプロジェクトとする。

3) 調査の過程において、カウンターパートに対し、技術移転を行なう。

(2) 調査の対象地域

チッタゴン丘陵地域約 13,000km^2 を対象とする。

(3) マスタープラン調査

調査はPhase IおよびPhase IIからなる。

1) マスタープラン調査（Phase I）

この調査は調査地域の現況およびこの地域の開発を阻害している問題に対し、バングラデシュ国チッタゴン丘陵開発省および関係省庁と協力して持続可能な具体的な対策を作成し、農林業農村開発のマスタープランを策定する。マスタープランの中の個々のプロジェクトの優先順位付けを行い、優先プロジェクトの中からパイロットプロジェクトを選定する。

このために、データ、情報をできるだけ収集し、分析を行うとともに、既存の開発計画をレビューし、問題点の解析およびその対策を作成する。その際、地域的条件別（気候、地形、標高など）および小セクター別（営農、林業、畜産、普及、加工処理、マーケット、農業研究組織、農民組織、灌漑排水、洪水対策、土壌保全、農道、給水など）に問題点を整理、分析を行い、持続可能な具体的なプロジェクトを策定する。優先順位付けの基準はできるだけ客観的に設定する。速効性、効果的であり、バングラデシュ国丘陵地域のモデルになりうるものから選ぶことが必要である。

2) フィージビリティ調査（Phase II）

1) の手順をふんで選定されたパイロットプロジェクトに対し、フィージビリティ・レベルの調査を実施する。この調査中、併行して次のような試験施設を設置する。この試験施設を設置することにより、具体的な施設を見せることにより、バングラデシュ国政府職員および関係農民を啓蒙することにも役立つこととなる。

- ふん尿を燃料として利用する試験施設、太陽エネルギーを利用してポンプ、農産物処理、加工などのための試験施設

（詳細は添付資料の Terms of Reference for the Study on the Sustainable Integrated Agro-Forestry Development in Chittagong Hill Tract を参照されたい。）

4-3　総合所見

農林業生産体制の再構築にとって最も重要と思われる点は、農地の改革によって、土地なし農民をできるだけ少なくし、市場経済の中で如何にして自立していくかである。

今までの体制の中で経営意識の薄かった農家の意識を変えていくという問題も重要なファクターであるが、基本的には持続可能となるような農林業生産整備が必要と考えられる。灌漑排水農業に必要な基幹施設はある程度存在するが、維持管理が不十分なため、利用効率はかなり低下している。これらの施設を新設・更新し、有効に利用し、新たに構築する農林業生産体制に組み込むことは緊急的課題である。生産体制の再構築には、ハードの分野として、ポンプ場、灌漑排水施設以下末端に至る灌漑排水施設の整備、土壌保全施設、道路、ソフトの分野としては、集荷場、貯蔵・加工施設、農業研究組織の再構築、農民意識の改革、農林業組合および水管理組織の再組織化、流通機構等改善すべき点は多々あるが、農業開発を促進する上でここにあげたマスタープラン調査を行うことは極めて重要と考えられる。

〈技術的可能性〉

個々の技術についてはある程度の水準にあると考えられるが、今後、マスタープランのような全体計画を立てる上で外国の技術協力が必要となってくると思われる。基本的な建設技術、管理技術および研究の蓄積はある程度あるように感じられた。カウンタパートとしての相手国政府技術者の技術力に関してはプロジェクト遂行上、全く問題ない。

〈社会・経済的可能性〉

バングラデシュ国の農林業部門は厳しい自然環境にあるが、伝統的な重要な生産部門で純生産で全部門の 1／3 および労働人口の 2／3 を占め、生産は停滞、むしろ穀物の生産は減退している。農林業の生産性を向上させるためには、農林業に適している地域に灌漑排水施設、洪水防止施設、土壌浸食防止施設の整備、農業支援体制の整備、特に、農地の改革が遅れているので、土地なし農民に土地を与える政策を促進することは主要穀物の増産を可能にするためには極めて緊急の課題で、バングラデシュ国農業にとって非常に大きな効果が期待される。

〈現地政府〉

当プロジェクトの担当のチッタゴン丘陵開発省は最近新設された。バングラデシュ国政府内でも新たな組織の一つである。チッタゴン丘陵地域の農林業生産体制の改善は市場経済を活性化するのみならず、バングラディシュ国の少数民族対策および治安維持の面からも極めて重要で、国家経済の安定には必須の課題である。

付　属　資　料

1) 調査団員の略歴

金津　昭治

〔職　歴〕

昭和 29 年	東京大学農学部農業工学科卒業
昭和 29 年	農林省入省（農地局建設部設計課）
昭和 50 年	構造改善局計画部地域計画官
昭和 51 年	東海農政局計画部長
昭和 52 年	構造改善局施工企画調整室長
昭和 53 年	国際協力事業団農業開発協力部長
昭和 55 年	関東農政局建設部長
昭和 57 年	（株）パシフィック コンサルタンツ インターナショナル入社 取締役農水事業部長、取締役コンサルティング事業本部副本部長、 第二事業本部副本部長、技師長室を経て、農業開発部、 農学博士（東京大学）、技術士（農業土木）

この間に、総理府資源調査会専門委員、東京教育大学農学部講師、東京農業大学客員教授、技術士本試験試験委員（農業工学）、（社）農業土木学会理事・海外委員会委員長のち関東副支部長、（財）日本農業土木総合研究所理事のち監事、（社）農業教育研究協会理事、全国農業土木技術連盟関東支部長、ADCA 運営委員会委員などを務める。

〔業務歴〕

昭和 42～56 年	マレーシア、ラオス、アフガニスタン、パラグアイ、インドネシア、ネパール、タンザニア、フィリピンに調査団長として参加
昭和 57～58 年	シェラレオーネ国ロンベ沼地農業開発計画実施調査団長
昭和 59～60 年	ホンデュラス国アグアン川流域農業開発計画実施調査団長
昭和 60～61 年	チリ国マポーチョ川流域農業開発計画実施調査団長
昭和 61～63 年	コロンビア国キンディオ盆地農業総合開発計画実施調査団長
昭和 63～平成元年	コロンビア国アリアリ川農業総合開発計画実施調査団長
平成 2～3 年	ブータン、エクアドル、コロンビア、メキシコ、ニジェール、マリ、ケニア、ウガンダ、タンザニアに事前調査団長として参加
平成 4～5 年	グァテマラ国フテイアプ県農牧業農村総合開発計画実施調査団長
平成 6～7 年	ブータン国ウォンディフォドラン県地下水開発実施調査団長
平成 8 年	インドネシア国アンブレラ協力計画策定調査団長
平成 8～9 年	インド国タミルナド州溜め池改修計画調査団長
平成 9～13 年	インド、パキスタン、ブータン、アルメニア、アゼルバイジャン、グルジア、ウクライナ、モルドバ、バングラデシュ、ギニア、ガンビア、ベナン、トーゴー、ウズベキスタン、トルクメニスタン、スリランカに事前調査団長として参加

2) 調査日程及び調査員の経歴

日程表						調査員名並びに経歴	
日数	年月日	出発地	到着地	宿泊地	備考	調査員名	経歴
	平成13年						
1	6月9日（土）	成田	バンコク	バンコク	出国（JL707 18:30 成田発 → 22:45 バンコク着）	金津 昭治	別紙のとおり
2	6月10日（日）	バンコク	ダッカ	ダッカ	移動（TG321 11:25 バンコク発 → 12:50 ダッカ着）	（総括・農業開発）	
3	6月11日（月）			〃	バングラデシュ農業省打合せ		
4	6月12日（火）			〃	〃	岸 篤 （農業開発） （6/9～6/27）	昭和53年3月 東京教育大学農学部卒業 昭和58年5月 ㈱パシフィックコンサルタンツ インターナショナル 現在 コンサルティング事業部農業開発部 次長
5	6月13日（水）			〃	JICA事務所打合せ、チッタゴン丘陵開発省打合せ		
6	6月14日（木）	ダッカ	チッタゴン	チッタゴン	ダッカからチッタゴンに移動		
7	6月15日（金）			〃	現地調査		
8	6月16日（土）	チッタゴン	ランガマティ	ランガマティ	〃		
9	6月17日（日）			〃	現地事務所と打合せ		
10	6月18日（月）	チッタゴン	ダッカ	ダッカ	チッタゴンからダッカに移動	Dr. M. Hassan （6/11～6/18）	昭和35年 ダッカ大学理学部 森林研究所入所 理学博士 現在 コンサルタンツ会社に在職（ダッカ）
11	6月19日（火）			〃	日本大使館表敬		
12	6月20日（水）			〃	資料整理		
13	6月21日（木）			〃	〃		
14	6月22日（金）	ダッカ	ジョショール	クルナ	ダッカからクルナに移動	Mr. A. Alam （6/22～6/25）	昭和60年 ダッカ大学理学部 三菱商事入社
15	6月23日（土）			〃	現地調査		
16	6月24日（日）	クルナ	ダッカ	ダッカ	現地調査、クルナからダッカに移動		
17	6月25日（月）			〃	日本大使館、JICA事務所に報告		
18	6月26日（火）			〃	バングラデシュ農業省に報告		
19	6月27日（水）	ダッカ	バンコク		移動（TG322 14:00 ダッカ発 → 17:20 バンコク着 →		
20	6月28日（木）	バンコク	成田		→ JL718 22:30発 ⟶ 6:20 成田着）		

3) 面談者リスト

List of Person Met During the Project Finding Survey

Embassy of Japan in Bangladesh

前田徹	参事官	日本大使館
石堂憲二	二等書記官	日本大使館

JICA

Mr.Takashi SAKAMOTO	Resident Representative	JICA Bangladesh Office
Dr.Toshiki SAITO	Technical Advisor to LGED	JICA Bangladesh Office

Ministry of Agriculture in Dhaka

A.Waheed Khan	Joint Chief	Ministry of Agriculture

Department of Agricultural Extension

Mr.M.Enamul Hoque	Director General	
Engr. Kazi Muzammel Hoque,FIE(B)	Deputy Director	Water Management & Agricultural Engineering Wing
Mr. Nurul Islam Bhuiyan	Joint Director	Planning & Evaluation Wing

Local Government Engineering Department

MD.Zahangir Alam	Project Director	Low Cost Bridge/Culvert Project
Engr. Md. Moshiur Rahman	Executive Engineer	
Mr.Saroj Kumar Sarker	Superintending Engineer	

Chittagong Hill Tract Development Affair

Chowdttury M. Mohsin	Secretary

Chittagong Hill Tracts Development Board in Rangamati

Tara Charan Chakuma	Vice Chairman (Joint secretary)

Department of Agricultural Extension in Rangamati

Krishibid Nanda Lal Das	Additional Director
Krisibid Paritosh Chakma	Deputy Director

Regional Council

Debadatta Khisa	Executive Officer
Rupayan Dewan	Member

Chakuma

Raja Devasish Roy	King of Chakuma

Mitsubishi Corporation, Dhaka Office

Mr. Hedeo Uemura	General Manager
Mr. James B. Rozario	Asstt General Manager
Mr. Asit Ahmad	Deputy manager
Mr. A. Alam	Senior Officer

Resources Management and Infrastructure Development Consultants (RMIDC)

Mr. Murshed Salam	Chairman
Dr. M. M. Hassan	Managing Director
Mr. Shaikh Fazlur Rabman	Managing Director

4) 収集リスト（引用参考文献含む）

List of Material Collected and Referred

- Hill Farming System and Resource Utilization in the Chittagong Hill Tracts A Baseline survey
  Hill Agricultural Research Station, Khagrachari Bangladesh Agricultural Research Institute
  June, 2000

- Environmental Economics in Bangladesh
  The World Conservation Union
  Association for Green Accounting

- Environmental Politics in Bangladesh
  Centre for Sustainable Development
  1999

- Country Report Bangladesh
  The Economist Intelligence Unit
  April, 2001

- National Water management Plan Project
  Water Resources Planning Organization
  Ministry of Water Resources
  June, 1999

- Recent Climatic Changes in Bangladesh
  South Asian Association for Regional Cooperation Meteorological Research Centre
  September, 2000

- Bangladesh Water Vision 2025 Towards a Sustainable Water World
  Bangladesh Water Partnership
  2000

- 1999 Statistical Yearbook of Bangladesh
  Bangladesh Bureau of Statistics
  May, 2001

- Water and Development in Bangladesh　A Retrospective on the Flood Action Plan
  Irrigation Support Project for Asia and the Near East
  1999

- Eastern Water Study
  Irrigation Support Project for Asia and the Near East
  1989

- The Chittagong Hill Tracts Life and Nature at Risk
  Raja Devasish Roy
  Society for Environment and Human Development
  July, 2000

- Agricultural Extension Manual
  Ministry of Agriculture
  January, 1999

- A Strategy for Implementing the New Agricultural Extension Policy
  Ministry of Agriculture
  January, 1997

- Strategic Plan 1999-2002
  The Department of Agricultural Extension
  1999

- Computer Based Data Maps on Soil and Hydrological Conditions of Bangladesh
  Department of Public Health Engineering
  United Nations Children's Fund
  January, 1996

- Chittagong Hill Tract Development Boacl
  Regional Planning and Development

- 最近のバングラデシュ情勢
  平成 13 年 1 月 11 日
  在バングラデシュ日本大使館

TERMS OF REFERENCE

FOR

THE STUDY

ON

THE SUSTAINABLE INTEGRATED AGRICULTURAL DEVELOPMENT IN KHULNA DIVISION

(DRAFT)

MARCH, 1999

MINISTRY OF AGRICULTURE

PEOPLE'S REPUBLIC OF BANGLADESH

TERMS OF REFERENCE
FOR THE MASTER PLAN STUDY ON
SUSTAINABLE INTEGRATED AGRICULTURAL DEVELOPMENT IN THE KHULNA DIVISION OF THE PEOPLE'S REPUBLIC OF BANGLADESH

Project Title:	The Master Plan Study on Sustainable Integrated Agricultural Development in Khulna Division
Location:	Khulna division of the People's Republic of Bangladesh
Requested Agency:	Ministry of Agriculture
Proposed Source of assistance:	Government of Japan
Desirable Time of Commencement:	As soon as possible

1. Background

Bangladesh has a total area of 143,998 sq km. It is surrounded to the west, north-west and east by India, and shares a south-eastern border with Myanmar for 283 km. To the south is the Bay of Bengal.

The topography is characterized by alluvial plains, bound to the north by the submontane regions of the Himalaya; the piedmontane areas in the north-east and the eastern fringes adjacent to Assam, Tripura and Myanmar are broken by the forested hills of Mymensingh, Shlhet, and Chittagong. The great Himarayan rivers, the Ganges and the Brahmaputra, divide the land into six major regions, which correspond to the six governmental divisions: north-west (Rajshahi), south-west(Khulna), south central (Barisal), central (Dhaka), north-east (Sylhet) and south-east (Cittagong). Because most of these areas lie on a major fault, seismologists warn that another massive earthquake like the one in 1897 could occur.

The climate of Bangladesh is subtropical and tropical with temperatures ranging from an average daytime low of 21℃ in the cold season to a top of 35℃ in the hot season. Annual rainfall varies from 1000mm in the west to 2500mm in the south-east and up to 5000mm in the north near the hills of Assam.

Three-quarters of the annual rainfall occurs between June and September. The 90% to 95% humidity in this season is almost unbearable. The humidity remains high all

year round, producing the thick fogs of winter and making chilly nights in the north feel much colder than they are.

Bangladesh has three main seasons: the monsoon or wet season from late May to early October; the cold season from mid-October to the end of February; and the hot season from mid-March to mid-May. There are two cyclone seasons – May to June and October to November.

Agriculture is the largest sector in the Bangladesh economy. It accounts for one-third of GDP and provides employment to two-thirds of the labour force. A well performing agriculture sector is crucial to economic growth, poverty alleviation and nutritional improvement of the population. The rural poor's access to food is considerably determined by what happens in the food economy, specifically through the demand for labour in food production and the price of food. The later greatly influences the rate of inflation due to the high share of food in consumer expenditure in the country.

Bangladesh has a good potential for agricultural development and achieving self-reliance in food. It is endowed with good soil and ecological diversity and vast untapped surface and groundwater resources for irrigation development. The country has made steady progress in agriculture in the post-Independence period. Between 1969 and 1993, the cropping intensity increased from 148 to 179 percent and foodgrain production almost doubled. During 1980-1993, rice production grew at 2.66 percent per annum, higher than the rate of population growth. Just a few years ago, the country showed it can produce enough foodgrains and even a small surplus of rice in a normal crop year.

The agricultural sector, however, has not been able to exploit its full potential for crop production. As a result, Bangladesh has been a net importer of food despite its comparative advantage in producing a number of crops both for domestic consumption and export. Poor nutritional indicators point to significant gaps in food consumption with serious implications on the country's future development. Apart from the severe land constraint about which very little can be done, there are several technological, institutional, infrastructural and policy constraints holding back the performance of the agriculture sector. Available projections indicate that the country may remain a food importer unless the constraints to productivity growth are addressed in time.

Several issues confront the agriculture sector in Bangladesh; foremost is the low and stagnating yields of most crops, including rice. Although the adoption of modern varieties has increased, yields have fallen in recent years. The main reasons for this are that the supply of high quality seed is grossly inadequate and the modern variety seeds used in Bangladesh are losing their vigor. Moreover, the expansion of minor irrigation has slowed down and the timely availability of fertilizer at the farm level has emerged as a problem. The imbalanced use of fertilizers and depletion of organic matter in the soil is affecting soil fertility on a long-term basis. A combination of these factors has led to the persistence of instability in the level of output. Thus, accelerating crop productivity and sustaining the growth of output are the major challenges for the agriculture sector.

The second issue is of crop diversification for its contributions to enhancing farmers income and nutritional balance, diversifying farm products and by-products in support of agro-industries, enhancing the biological stability and productivity of cropping systems in lands marginally suited to rice, and improving soil quality and production capability. Moreover, accelerated growth in rice production will be difficult to sustain without crop diversification due to the problem of disposing a surplus rice output and the consequent price collapse observed in the aftermath of the recent-years' bumper crops.

The third issue is the impact on environmental sustainability of agricultural development. There are signs of increasing land erosion, soil degradation, water logging and salinity problems. The water table is declining in several areas. Lack of appropriate technology and the capacity to invest in preserving the environment are all at work. Preventive and mitigating measures need to be undertaken immediately.

The forth issue is the question of using agricultural growth as the major instrument of poverty alleviation, improved nutrition and food security for the poor. While, in the small farmer-based agricultural system of Bangladesh, agricultural growth is inherently beneficial to the poor, enhancing the productivity of the lands and crops grown by the poor and intensifying the farm-non-farm sector linkages through rapid agro-industrial development based on indigenous products would hasten the progress in poverty alleviation.

2 Present Conditions of Agriculture and Constraints for Development with Emphasis on Khulna Division

2.1 General

Being an agriculture-dependent economy with a growing population and having one of the world's lowest land/man ratio, the most important issue in Bangladesh agriculture is to enhance and sustain growth in crop productivity.

There are wide gaps between the potential and the realized yields for all crops in Bangladesh (Table 2). Studies indicate that the yield potential of the existing HYVs of rice is more than 4.0 tons/ha milled rice (or 6.0 tons/ha rough rice), whereas the average yield of the majority of farmers is only about 2.0 tons/ha. The gap is even greater in wheat. The yield potential of the HYV wheat is about 4.0 tons/ha while the average yield in farmers' fields is 1.8 tons/ha.

Thus, the foremost priority for Bangladesh is to **accelerate and sustain crop productivity growth** by closing the yield gaps and increasing the cropping intensity. The Government has appropriately included this objective in declaring food self-sufficiency and self-reliance in food as the short-term and long-term goals for the agriculture sector.

The second issue confronting Bangladesh agriculture is **crop diversification**. With rice occupying almost 75 percent of the cropped area followed by wheat (4 percent), only about 21 percent of the cropped area is devoted to other crops.

Third, the issue of **environmental sustainability** of agricultural development is important for Bangladesh. Signs of land degradation resulting from cropping and soil management are already noticeable. Scientists have estimated that about 32 percent of net cultivated land suffers form salinity problems. Another 12 percent of the country's area (hilly lands) is highly eroded. More than half of the cultivated area has inadequate drainage and suffers from water logging and poor aeration. Increasing ground water utilization is already leading to declining water table in some areas resulting in inoperative shallow tubewells, decrease in the dry season flows of waterways, increased salt water intrusion in coastal areas, induced aquifer recharge which increases the risk of groundwater pollution, and degradation of aquatic resources.

Fourth, as an agricultural development strategy for Bangladesh should tackle the interrelated issue of **poverty alleviation, malnutrition and food security** because of their close linkages with the state and performance of the agriculture sector. About 50 million people are categorized as poor in Bangladesh, where poverty is manifested in several ways, including low income, inadequate calorie intake, poor health, low level of educational attainment, and limited access to social service. Due to a severe land constraint, low yields and increasing population pressure, most producer households are net buyers of food. The incidence of hard-core poverty (defined on the basis of calorie consumption below 1,805 kcal per day) is higher among agricultural than non-agricultural households. Reduction in poverty is critical to food security. Moreover, enhancing the ability to buy food contributes to the sustainability of accelerated growth in agriculture.

An agricultural development strategy for Bangladesh must explicitly consider its implication on reducing poverty and specifically propagate technology and promote investment to improve the productivity of the crops and lands cultivated by the poor. It should also enhance the returns to labour. This would need a balanced emphasis on the development of prime lands as well as marginal lands, and of rainfed technology for crops grown by the poor. Since small and marginal farmers form the bulk of the poor, agricultural strategy must be geared toward improving the productivity of such farms.

2.2 Khulna Division

Of all the division of Bangladesh, Khulna is most marked by the fingers of the Ganges which sluice down into the Bay of Bengal, creating a vast maze of waterways. Two - thirds of Khulna Division is marshland or dense jungle and a haven for wildlife. In the south are the Sundarbans ('beautiful forest') a huge, almost untouched tract of water-logged jungle.

Khulna is the south-west of Bangladesh and borders the state of West Bengal in India (Fig. 1). In the north, the Padma (Ganges) River slices it off from Rajshahi Division, while the new 'breakaway' Barisal Division forms the eastern boundary.

The dense jungles and numerous rivers formed natural barriers to any invasion from the west or east. Even after its late settlement Khulna Division remained relatively neglected by the Mughals emperors of India, and it was not until the arrival of the British that it started to be developed.

Nowadays it remains the centre of the declining jute industry, once the backbone of the economy, and the fish and shrimp processing industry, which continues to thrive. Several large match factories and the only newsprint mill in the country have been set up in this division as well. Except for matches, all of these products are shipped out through the international port of Mongla.

The ministry of agriculture (MOA) is responsible for the implementation of agricultural policy and realization of agricultural production objectives. Division level agricultural extension departments are established for project implementation and administrative control (Fig. 3, Fig.4)

2.3 Agricultural production

In the socio-economic context of Bangladesh, crop diversification is unlikely to succeed at the cost of rice production. Aman and Aus rice is grown on 79 percent of the cropped area in the Kharif season (May to October) with sugarcane and jute as alternative crops. In the Rabi season (November to April), rice occupies a much lower proportion of the cropped area (45 percent). Thus, maximizing production of monsoon season Aman rice crop which is generally better suited than other crops under high rainfall/flooding conditions would provide a better sense of food security and a more favorable relative price regime for crop diversification in the dry (Boro) season.

Most of the arable lands are already under cultivation. The expected population increase will further fragment the already small farmholdings. Moreover, agriculture will have to maintain its large share of the Gross Domestic Product and continue to be an effective vehicle for the reduction of rural poverty. The only way for agriculture to grow at a high sustainable rate is to increase the unit area productivity of the existing production systems. In view of the high incidence of poverty among agricultural households, the effort towards highly productive and intensive production systems should focus on assisting small and marginal farmers.

During the last 25 years, Bangladesh has made steady progress in the adoption High Yielding Varieties (HYV) of rice, wheat, jute, potato and sugarcane (Table 1). In 1994-1995, 50.3 percent of the area under rice cultivation was using high yielding varieties, a ten-fold increase over 4.7 percent in 1970-71. Availability of high quality seed, irrigation and credit are often cited as the major constraints to faster adoption of the HYV. The percentage usage of HYV seeds in total arable area are characterized by shallow land profile with low moisture holding capacity and heavy sub-surface

clay. Crop production in these areas and all the four Gangetic Flood plains is mainly dependent on rainfall and on the inundation from the Ganges River and its tributaries. However, for the entire Ganges belt and the Barind and Madhopur Tracts, no crop cultivars nor rainfed farming practices specially suited to the prevailing soil and agro-climatic conditions have been developed.

There is an urgent need to develop drought tolerant crop varieties and drought mitigating technologies that could make maximum use of the land resources of the rainfed farming systems and the limited rainfall in the region. Such technologies would include appropriate water storage and rain water harvesting technologies, supported with packages of agronomic practices to increase productivity of the Kharif crops and some vegetables.

The need for crop diversification has been long recognized, but due to the priority given to achieving self-sufficiency in foodgrains (especially rice) it has not made much headway. Much of the commodities currently imported could be substituted through domestic production. Such diversification of cropping patterns, particularly towards the production of high-value crops, would enhance farmers' income and help maintain a better soil structure. The Government has undertaken programmes to promote crop diversification, that includes several non-rice crops.

A recent study on the subject indicates that from the technology and marketing standpoints, Bangladesh farmers can readily diversify toward traditional fruits and vegetables (including pulses) for domestic and export markets and cotton for domestic consumption. Further improvements in market and technology would make feasible production of non-traditional fruits and vegetables for the export market and maize, sunflower and soybean for the domestic market.

Crop diversification could be accelerated by increasing the acreage and production of economically advantageous non-rice crops, expanding the market opportunities for these crops and developing a modern agro-industry for their utilization. The public sector can facilitate crop diversification through adequate research and extension services on non-rice crops in suitable areas, improving drainage and on-farm water management facilities, transport infrastructure, processing and marketing facilities, and business and industrial extension in product/by-product processing and export market exploration.

2.4 Irrigation

The expansion of irrigation is a vital component of the Government of Bangladesh's (GOB) strategy in increasing the production of foodgrains as well as minor cereal and non-cereal crops. The expansion in the area with irrigation facilities (irrigation command area) has been remarkable during the past several decades. In 1994-95, the irrigation command area totaled some 3.04 million ha, or more than 42 percent of the potentially irrigable area of 7.12 million ha. This was up by about 0.25 million ha from the previous crop year's total irrigation command area.

Minor irrigation rapidly grew from 1.36 million ha in 1982-83 to 2.87 million ha in 1994-95, or a compound growth of 5.9 percent per annum. This made it possible for Bangladesh to make a progressive shift from a high-risk monsoon dependent agriculture to low-risk agriculture based on irrigation. This growth, however, has not been steady. There have been fluctuations in the rate of growth and utilization of irrigation equipment in response to government policy changes or output price movement. For example, while the liberalization of trade and removal of siting restrictions and standardization requirements propelled rapid expansion in minor irrigation from 1986-8 to 1989-91, the rise in fuel price in the wake of Gulf War, withdrawal of subsidies and the reimposition of siting restriction caused a slowdown in 1990-91 and 1991-92. Similarly, the slump in cereal price in 1992 and 1993 led to another slowdown in its development in 1993-94. Future growth of minor irrigation will therefore largely depend on appropriate and timely adjustment of policies to further encourage private sector and individual farmers participation in minor irrigation development.

Within the minor irrigation sub-sector, there are variations in developmental trends. While the privatization of irrigation equipment has provided renewed stimulus for the installation of shallow tubewells (STWs), this has not happened in the case of the deep tubewells (DTWs) which previously enjoyed Government subsidy. Previous studies have shown that the development cost of forced mode technologies (e.g. DTWs) is 5 to 10 times more than that of sunction mode irrigation (e.g.STWs and treadle pumps). Moreover, DTWs have lower water use efficiencies and higher operating costs. As such, they are not commercially attractive to farmers at full cost. This reality is not favourable to farmers in Khulna Division where DTWs are the only technically feasible mode of irrigation.

The expansion of minor irrigation facilities in the future is likely to be through STWs, HTWs and LLPs (Table 3). Government efforts in promoting both minor and major irrigation development have been focused mainly on hardware (irrigation machinery and infrastructure) with little attention to the provision of support services. As a result, the performance of minor irrigation has been poor and less than half of the potential benefits from irrigation development are being realized. Research on and extension of appropriate on-farm water management technologies for the optimum production of diversified crops and their efficient use of irrigation water are lacking. A large number of minor irrigation equipment is underutilized; their discharge efficiency and overall water use efficiency are low. In this context, the GOB should now give more attention to providing effective support to on-farm water management, as well as the operation and maintenance of minor irrigation facilities in order to enhance the economic returns from groundwater irrigation.

2.5 Agricultural Credit

The major part of the credit to farmers and fishers has been met by informal sources which usually charge very high interest rates. These sources provide primarily short-term production credit and are not generally effective in meeting the medium-to long term credit requirements. The second major source of credit in the rural areas are the semi-formal institutions or NGOs (e.g., Grameen Bank and BRAC), which provide targeted credits to the poor rural households. Most of these institutions have a general orientation to poverty alleviation and, except the Grameen Krishi Foundation and Rangpur Dinajpur Rural Service, lend money to households owning less than 0.5 acres of land. The third source are the formal sources, comprising the nationalized commercial banks and agricultural and specialized banks, Bangladesh Krishi Bank (BKB), Rajshahi Krishi Unnayan Bank (RAKUB), and Bangladesh Samabasya Bank (BSB).

In recent years, there has been a drastic cut in the share of agricultural sector in the total credit delivery to the private sector from formal sources. This share declined from 16.4 percent in 1984-85 to 5.2 percent in 1993-1994. In fact, the agricultural credit issued by the formal sector declined even in nominal terms, from taka 11,317 million in 1984-85 to taka 11,008 million in 1993-94. The major reasons for this are low repayment due to lax lending and recovery operations, inappropriate use of loans and widespread default. In 1994-95, 67.6 percent of the outstanding agricultural credit from the nationalized commercial banks and BKB, RAKUB, BSB and the

Bangladesh Rural Development Board (BRDB) became overdue and less than 20 percent of the loans were recovered.

The low interest rates to this priority sector understandably dissuades financial institutions from further lending to agriculture, creates scarcity value, encourages rent seeking, and at times attracts political interference on loan recovery. Moreover, since 1991/92, the Central Bank, under the financial sector reform programme, has instructed credit institutions to set their own credit targets. It has also discontinued its refinance facility except for the BKB, RAKUB and the Sonali Bank. These two measures also dampened the expansion of agricultural credit.

The low repayment of agricultural credit may partly be traced to the recurrent crop losses suffered by farmers as a result of climatic uncertainties and natural disasters. A recent ADB-supported study on the feasibility of a crop insurance scheme has recommended a crop insurance development programme to be undertaken in three phases, namely: (i) technical assistance to develop and initiate crop insurance, (ii) start-up of the agricultural insurance consortium and (iii) continuing evaluation of applications. The proposed programme is under review.

Crop insurance is new to Bangladesh and there is not much experience or empirical data from which to draw a definite conclusion regarding its feasibility. One pilot scheme operated by Sadharan Bima Corporation (SCB) during 1977-92 was not particularly successful and suffered heavy losses.

2.6 Agricultural Marketing

Marketing is a weak link in the development of agriculture in Bangladesh, particularly for non-cereal crops. There is no coherent policy for agricultural marketing. Within the policy framework of economic liberalization and privatization, the Government does not envisage any major role for itself in the marketing of agricultural produce.

However, with a more intensive system of crop production and the increasing emphasis on diversification, the marketing problems – particularly with perishable crops – are likely to multiply unless remedies are introduced. Marketing costs are already high because of an inadequate infrastructure, high price risks and the lack of credit to traders.

Of the vast numbers of primary and secondary markets in the country (some 7,800), the Department of Agricultural Marketing (DAM) is responsible for fixing market charges in only 393 markets. The market centres are under the control of the Ministry

of Land (which owns the sites) and the Ministry of Local Government, Rural Development and Cooperatives (which collects marketing fees from vendors). Moreover, DAM is one of the weakest departments in the Ministry of Agriculture. At present, its main activity is market intelligence.

The importance of a vertically coordinated, efficient and integrated market system in facilitating agricultural growth cannot be overemphasized. In view of the above considerations, it is recommended that a review of the agricultural marketing situation be carried out, taking into consideration its development needs and the existing institutional and regulatory framework vis-à-vis the present macro-economic policy. The review should lead to the identification of appropriate roles and functions for the private and public sectors in market improvement and a clear definition of responsibilities of the public sector agencies in the market-oriented economic policy framework.

During the last two decades, the real price of foodgrain (rice and wheat) has fallen steadily. This was more so in recent years when cereal prices fell drastically. The steep price decline started in September 1992. By July 1993 the national weighted average price of rice was 30 percent lower than the previous year's. After one-and-a-half years (by March 1994), the prices (in nominal terms)reverted to their August 1992 level. They peaked in March 1995, but started to fall again one year latter in March 1996. From March to September 1996, the national average wholesale price of coarse rice fell by 21 percent in nominal terms, and the pricein September 1996 was at the same level at that in September/October 1992 when the first round of price collapse started.

The steep drop in the price of rice evokes different responses from farmers, traders, consumers and the Government. As a result of the bumper harvest and the rice price collapsed in 1992-93, the total area under rice cultivation in the following crop year declined by about 200,000 ha (more than 2 percent), fertilizer application decreased by more than 4 percent and the irrigation command area declined by 2.1 percent compared to a growth of 6.3 percent in the previous year. The low price of rice was, however, a blessing to the poor urban and rural consumers.

While ensuring adequate supply of rice at affordable prices to Bangladeshi consumers will largely depend on the country's ability to achieve higher rice yields in an environmentally sustainable manner, the Government has to formulate an effective mechanism to deal with price shocks to minimize its adverse effects.

2.7 Agro-Processing

Bangladesh experiences seasonal surpluses in several agricultural commodities of perishable nature. Development of agro-processing facilities can prevent post-harvest losses and enhance farmers' income. The agro-processing industries are in nascent stage of development. Most of the technologies and facilities for handling, storage, processing and packaging of farm products and by-products are substandard and outdated. There is considerable under-utilization of capacity.

Policies for food processing industries in Bangladesh are a part of the 1991 New Industrial Policy, which has the broad objective of developing a competitive market economy. Indeed, the greater emphasis on crop diversification should pave the way for an efficient, market-oriented agro-industrial development and vice versa.

The GOB should therefore introduce specific policies and policy instruments conducive to the development of the agro-industries in which the country has a comparative advantage. Policy instruments should involve R&D for products and processes and low-cost substitutes for imported packaging; quality standards; credit for agro-industry, and incentives in the form of tax relief and tariff protection during the growth stage of the industry. In this regard, two institutional developments in recent years are noteworthy: the establishment of Hortex, a private board for horticulture promotion, and the USAID-supported ADTP which conducts regular monitoring of the country's agribusiness markets and provides information on the developments in foreign markets and opportunities in agro-industries.

In addition to the above, the GOB can play a pivotal role in promoting the vertical coordination/integration of production from farm to industry by bringing together the public sector institutions, private entrepreneurs, financial institutions and farmers for enterprise development based on such mechanisms as contact farming. Such arrangements are beneficial to all parties; they reduce the price risk for the farmers and the supply risk for the processing unit. Moreover, they alleviate the pressure on the government to offer price support and enhance the loan repayment performance of the lending institutions. There are several successful examples of this modality in Southeast Asian countries which Bangladesh can emulate. Finally, the institutions involved in the processing and preservation of agricultural produce need to be strengthened, namely Bangladesh Council of Scientific and Industrial Research (BCSIR), Bangladesh Standard Institute (BSI) and Bangladesh Small and Cottage Industries Corporation (BSCIC).

2.8 Rural Infrastructure

The development of rural infrastructures and the growth of agriculture are interlocked. Good infrastructures, such as roads and riverine transport network, promote agricultural optimal level. In this regard, market imperfections must be tackled by improving infrastructure, access to information, technology and credit as well as appropriate changes in the rules and regulations governing business transactions. Moreover, the public sector must provide public goods and services which could not be efficiently supplied by the private sector, support development of technical know-how, and promote access to foreign markets, technology and capital. Finally, the public sector has to establish effective legal framework, provide phytosanitary and quarantine services, set product standards and test and certify product quality, and encourage sustainable use of natural resources.

2.9 Woman in Development

Woman in Bangladesh constitute a significant portion of the labour force (43 percent in 1989). They are also very active in agriculture. Gender disaggregation of key human well-being, woman in Bangladesh are worse off than men. Over 95 percent of the female-headed households fall below the poverty line. The incidence of malnutrition among children is higher among girls. Death of children aged 1-4 years is 23 percent higher for girls than for boys. The women have lower adult literacy rates and they are paid lower wages. The GOB has assigned a high priority to the development of women as a disadvantaged section of the population. This policy is reflected in activities in both economic and social sectors with some improvement in certain social indicators such as adult literacy.

The efforts to increase the role played by women by several NGOs (e.g., Grameen Bank, BRAC and Swanivar) have been fairly successful. The results suggest that to ensure full and effective role of women in the development process, they need to upgrade their skills as well as to improve their status in decision –making. Here, it is important to allocate additional public sector resources to increase the enrollment of girls in the educational system, train adult women in income generating activities and increase the number of well trained Female Block Supervisors.

2.10 Land Reform and Land Use

Control over assets, particularly the access to land, is a major determinant of household income in Bangladesh, particularly in rural areas. Two-thirds of the rural

poor are landless. The high degree of income inequality in the country is closely related to unequal distribution of land ownership. The top 10 percent of the households control 5 percent of the total land while the bottom 40 percent own only 2 percent. The concentration ratio in land ownership is estimated at 0.69.

With a per capita net cropped area endowment of 0.0064 ha in 1992-93, Bangladesh has one of the highest densities of population on land in the world. The average size of land holding is declining due to the inheritance laws under which the land is divided equally among the siblings and the need to construct houses for the growing population. In this extremely land-scarce situation, the present ceiling on land ownership in Bangladesh is 25 bigha, or 3.37 ha. However, the state of land records makes it very difficult to verify how much land an individual really owns. Sharecropping tenancy is widespread as the smaller pieces of land are not enough for subsistence and some of the owners have to reside in distant towns to earn additional income.

The Land Reform Ordinance of 1984 has provision for the protection of tenants and share-croppers. The basic issue, however, is the lack of enforcement of the Ordinance. In many areas, most farmholdings are small, and large landlords are virtually non-existent. Thus there is very limited scope for comprehensive redistribution of land. Reducing the ceiling of land ownership is not much relevant to Bangladesh.. The legal difficulties it will create would offset expected benefits. In any case, it is politically unacceptable and costly to implement.

3 Required Technical and Financial Cooperation

Bangladesh has embarked on a historic and difficult economic transformation and agricultural reform. Japanese technical and financial cooperation can ensure that this reform process is successful and contribute for increased agricultural production in Bangladesh. In particular, cooperation is urgently needed for the integrated agricultural development in Khulna Division for the following actions.

1. Formulation of a master plan for increasing the agricultural production in the Khulna Division of Bangladesh.

2. Rehabilitation of irrigation & drainage facilities, flood control facilities, rationalization of irrigation & drainage networks, formation of Water Users Associations

    1) Repair of deteriorated canal net works

2) Improvement of O&M of irrigation and drainage system through establishment of WUA

3) Replacement of pipes and tubewell pumps

3. Preparation of suitable land use plan based on the land suitability

4. Establishment of a competent land administration system

5. Establishment of effective agricultural input supply and product marketing system

6. Modernization of agricultural supporting services such as seed industry, agricultural processing and machinery maintenance.

7. Design of efficient agricultural finance systme benefiting private farmers.

8. Promotion of environmental friendly agriculture methods

9. Controlling the use of agricultural chemicals; reducing the overgazing and reversing the land degradation due to cultivation

10. Establishment agricultural statistical services and modernization of agricultural education, research and extension services.

11. Training of professionals in agricultural research, extension and administration.

4. Objectives

Based on the above background, the major objectives of the Study are defined as follows:

(1) To conduct a Master Plan Study in the Khulna Division of the People's republic of Bangladesh to identify the major problems and the respective projects which can tackle and mitigate these problems for the sustainable integrated agricultural development (Phase I Study)

(2) To divide and prioritize the projects according to the necessity of the project for the development of the area and select the pilot project(s) which have higher priorith and feasibility to be implemented (Phase I Study)

(3) To Analyze the feasibility of the selected pilot projects identified through the Master Plan (Phase II study)

(4) To make technology transfer to the counterpart personnel and to the farmer leaders of the Study Area through out the course of the Study

5. Proposed Study Area

The Study area shall cover the Khulna Division of the People's Republic of Bangladesh with an area of approx. 22,000 sq.km. The Study Area is shown in Fig. 1.

6. Scope of the Study

The study shall comprise of two phases; i.e., Phase I and Phase II.

6.1 Master Plan Study (Phase I Study)

The Master Plan Study for the proposed Study Area will be Conducted to study the existing conditions and to identify suitable countermeasures and the projects which can eliminate or lessen the major constraints which restrict the agricultural development. The sustainable integrated agricultural development projects will be formulated and the pilot projects will be selected for the next stage of the Feasibility Study. For this purpose, the following works shall be carried out in association with the related agencies.

(1) An extensive inventory survey shall be carried out throughout the People's Republic of Bangladesh to collect and review the data and information and to analyze the existing conditions on the following major items:

1) Irrigation, Drainage, Flood Control and its related facilities

(i) Existing condition of the irrigation canals, canal lining and drainage network

(ii) Existing condition of flood control facilities

(iii) Water management and water users association

2) Basic data and information

Apart from the above data the following information shall be collected on the following aspects of the Study Area.

(i) Natural conditions including topography, geology, meteorology hydrology, water quality etc.

(ii) Social conditions including population, social organizations, education, land tenure, employment, socio-economy etc.

(iii) Agronomic conditions including soil, land use, soil erosion, soil salinity, farming practices and cultivation techniques, crops and yields, extension, animal husbandry, livestock protection etc.

(iv) Conditions of agriculture infrastructure facilities including irrigation and drainage, farm roads, agricultural processing marketing facilities etc.

(v) Conditions of social infrastructure facilities including transportation, domestic water supply, rural electrification, sanitation, social welfare etc.

(vi) Agroeconomic conditions including production cost, farmer's organizations, cost-benefit, socio-economy etc.

(vii) Environmental Aspects

(2) Review of existing development plans in the Study Area

(3) Analysis of the major constraints which restrict the development of the area

(4) Identification of suitable countermeasures and the projects to eliminate or lessen these constraints

(5) Classification of areas according to the similarity of constraints for development

(6) Formulation of sustainable integrated agricultural development programs based on the above data and information. The development programs will be formulated considering the following aspects:

(i) Formulation of Basic Agricultural Development Plan including the land use plan for the Khulna Division.

(ii) Identification of area-wise priority projects which include various components of the countermeasures which can solve or migrate the constraints of development as mentioned below:

i) Agricultural development and improvement including farming techniques, agricultural extension, agricultural processing, marketing, and farming organizations

ii) Restructuring and development of agricultural infrastructure facilities with respect to water resources, on farm irrigation system, drainage etc.

iii) Development of social infrastructure facilities such as rural roads, domestic water supply, sanitation, rural electrification etc.

iv) Other necessary components of the projects pertaining to each selected area

(7) These projects shall be prioritized according to their necessity and importance and selection of pilot project(s) for the Phase (II) Study shall be made.

(8) Based on the necessity of the pilot project(s), detailed topographical and landuse surveys shall be carried out in the selected areas and the maps shall be prepared.

6.2 Feasibility Study (Phase II Study)

Technical and economical feasibility of the selected pilot project(s) shall be carried out covering the following aspects:

(1) Intensive surveys in the priority areas and collection of data and information necessary for the feasibility study

1) Meteorological, hydrological and water quality survey

2) Soil, agronomical and land use survey

3) Survey of irrigation and drainage systems and on-farm irrigation and drainage facilities

4) Livestock survey

5) Survey of agricultural processing, and agro-industry

6) Survey of rural infrastructure including domestic water supply, sanitation, rural electrification etc.

7) Marketing and social infrastructure survey

(2) When experimental facilities are required for collecting the necessary data and information for these projects, construction and monitoring of the experimental facilities shall be carried out. The experimental facilities shall cover the following aspects:

◆ Experimental facilities to explore and analyze the possibility of using farm & animal wastes and local energy for the rural development. The local energy shall be used for integrated agricultural development activities including water pumping, post harvest, agricultural processing, rural electrification etc.

(3) Analysis of data and information and formulation of a detailed concrete development plan for each project selected in this Study

(4) To undertake a preliminary engineering design for the various facilities of the project

(5) To prepare the cost-estimate for the selected project(s)

(6) To carry out the economic and financial analysis of the project(s)

(7) To evaluate the social and environmental impacts of the project(s)

(8) To prepare an optimum implementation program for each of these project (s)

(9) To establish a guideline for the water users association and irrigation department regarding the operation, maintenance of the irrigation system and the effective water management practices.

(10) To propose planning mechanisms for developming a strategic plan for the agriculture research system and the priority directions of the agrarian science and the respective research programs according to those directions.

(11) To propose cooperation linkages with farmers, farmers associations and research institutes.

6.3 Study Schedule

The study shall be carried into two phases; i. e Phase I and Phase II. A tentative Study Schedule is shown in Fig 3.

6.3.1 Master Ploan Study (Phase I Study)

The master plan study shall be carried out within a period of 8 months, i.e. field work for 5 months in Bangladesh and home office work for 3 months in Japan from the date of commencement.

6.3.2 Feasibility Study (Phase II Study)

Following the master plan study, the feasibility stuey shall be carried out within a period of 10 months, i.e. field work for 6 months in Bangladesh and home office work for 4 months in Japan.

6.4 Reports

The following reports will be made by the Study Team and submitted to the Government of Bangladesh.

1) Inception Report

   Twenty (20) copies at the commencement of the study

2) Progress Report(I)

   Twenty (20) copies at the end of the field Work in Bangladesh

3) Interim Report

   Twenty (20) copies at the end of the Master Plan Study and the commencement of Feasibility Study

4) Progress Report (II)

   Twenty (20) copies at the end of the Phase II Study in Bangladesh

5) Draft Final Report

   Twenty (20) copies at the end of the Home Office Work of the Phase II Study in Japan

6) Final Report

   Fifty (50) copies within 2 months after the receipt of comments from the counterparts on the Draft Final Report.

7. Estimated Project Requirements

7.1 Japanese Contribution

The government of Japan is kindly requested for the technical cooperation through Japan International Cooperation Agency (JICA) including dispatching the Study Team, supplying the equipment and other facilities mentioned below for the Study and performing transfer of knowledge to the counterpart personnel of the Study.

7.7.1 Expertise for the Study

The expatriate experts required for the study will be as follows:

- Team Leader
- Irrigation and drainage Engineer
- Meteorology and Hydrology Expert
- Soil and Land Use Expert
- Agronomist
- Livestock Specialist
- Agricultural Processing/Marketing Expert
- Rural Development Planner
- Design and Cost Estimate expert
- Project Economy and Cost Estimate expert
- Surveyor
- Environmental Expert

Total: 12 experts

7.1.2 Equipment and Other Requirements

Three personal computers and programs for hydrological calculations

Local transport for the Study Team – 3 Mini vans

Xerox machine for the Study purpose

Water Quality Checker for insitu measurement of the water quality

The above facilities shall be handed over to the Ministry of Agriculture of Government of the People's Republic of Bangladesh after the completion of the Study. It is requested that the study Team shall bring all the necessary equipment, materials and other consumable items required for the Study.

7.1.3 Counterparts Training in Japan

Counterparts training shall be carried in Japan for 1 to 2 month(s) period about the Advanced Crop and Water Management Techniques & Agricultural Research System in Japan.

7.2 Contribution from the government of Bangladesh

In order to facilitate smooth implementation of the Study, the Government of the people's Republic of Bangladish shall take the following measures:

(1) To secure the safety of the study team

(2) To permit the members of the Study team to enter, leave and sojourn in the People's Republic of Bangladesh in connection with their assignment therein, and exempt them from alien registration requirements and consular fees.

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

(4) 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.

(5) The following facilities and arrangements shall be provided to the Study Team in cooperation with the relevant organizations:

- Data and information for the Study
- Office room(s) and materials
- I.D. Cards for the members of the Study

(6) To assign full time counterpart personnel to the Study Team during their stay in Bangladish to play the following roles as the coordinator of the Study.

- To make appointments, and set up meetings with the authorities, departments, and firms wherever the Study Teamintend to visit.
- To attend the site survey with the Study Team and make arrangements for the accommodation, getting permissions etc.
- To assist the Study Team for the collection of data and information

(7) To make arrangements to allow the Study Team to bring all the necessary data and information, maps and materials related to the Study.

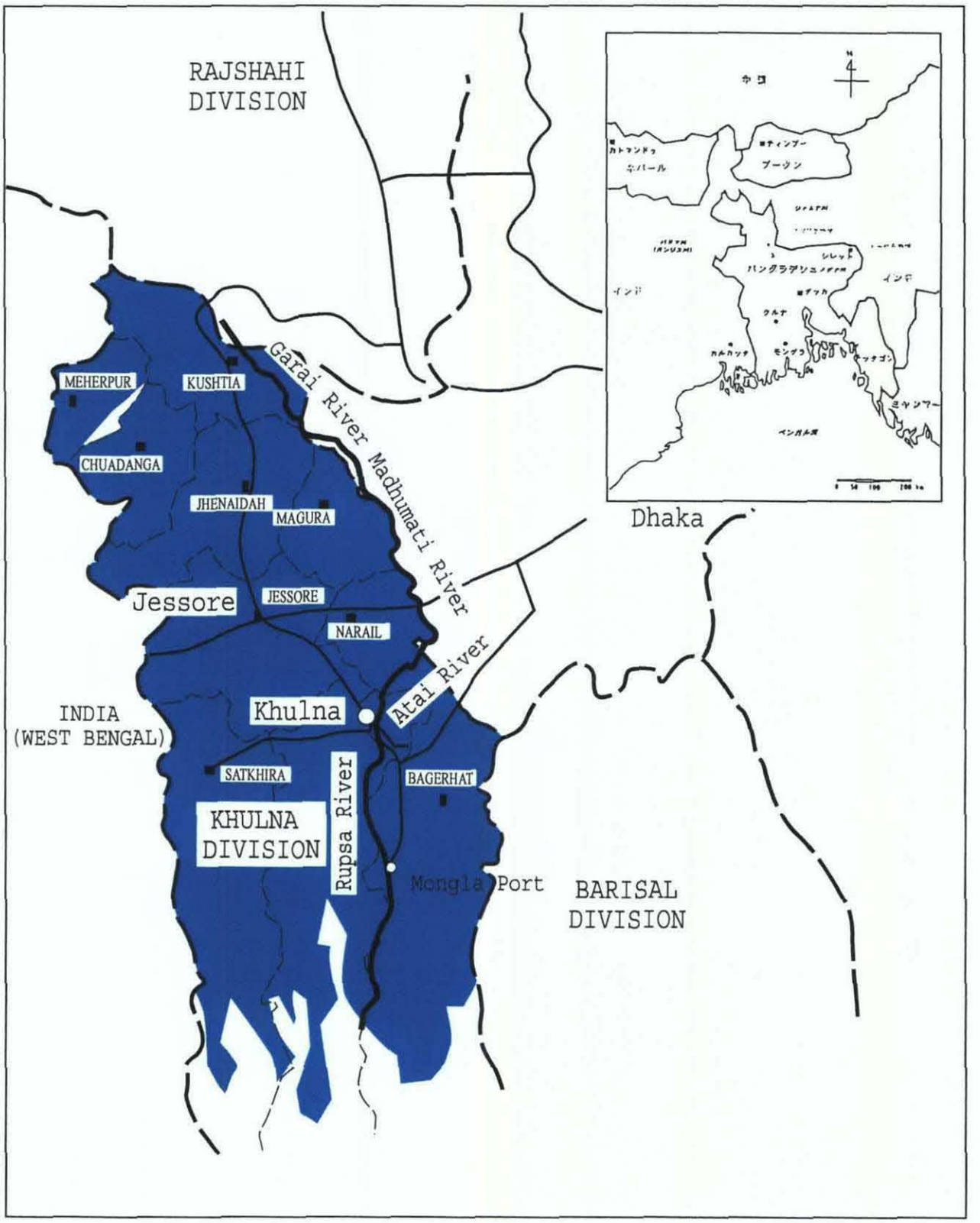


Fig. 1 : Location of the Study Area

FIG.2 TENTATIVE STUDY SCHEDULE

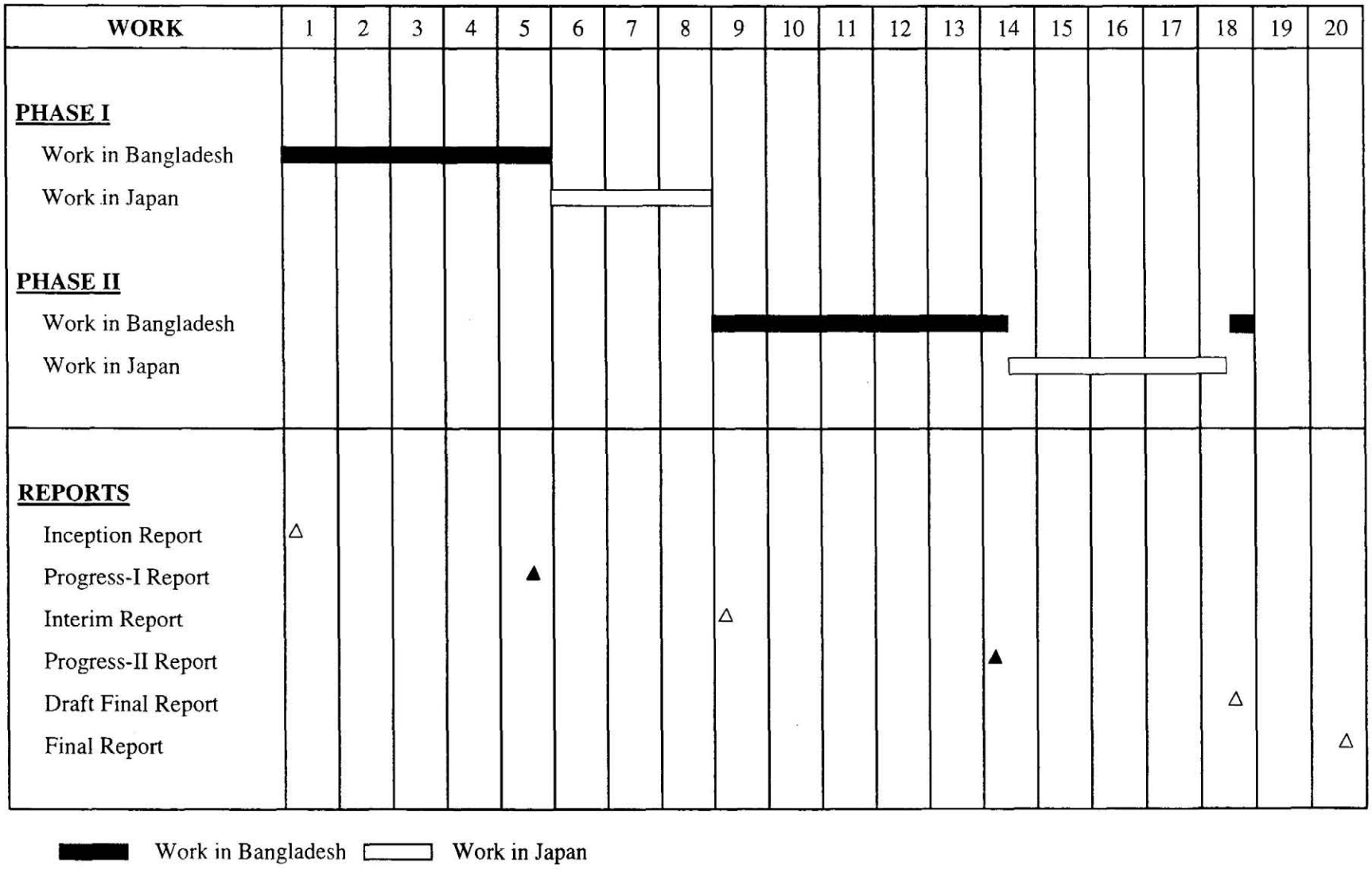


Fig. 3 DEPARTMENT OF AGRICULTURAL EXTENSION
MINISTRY OF AGRICULTURE

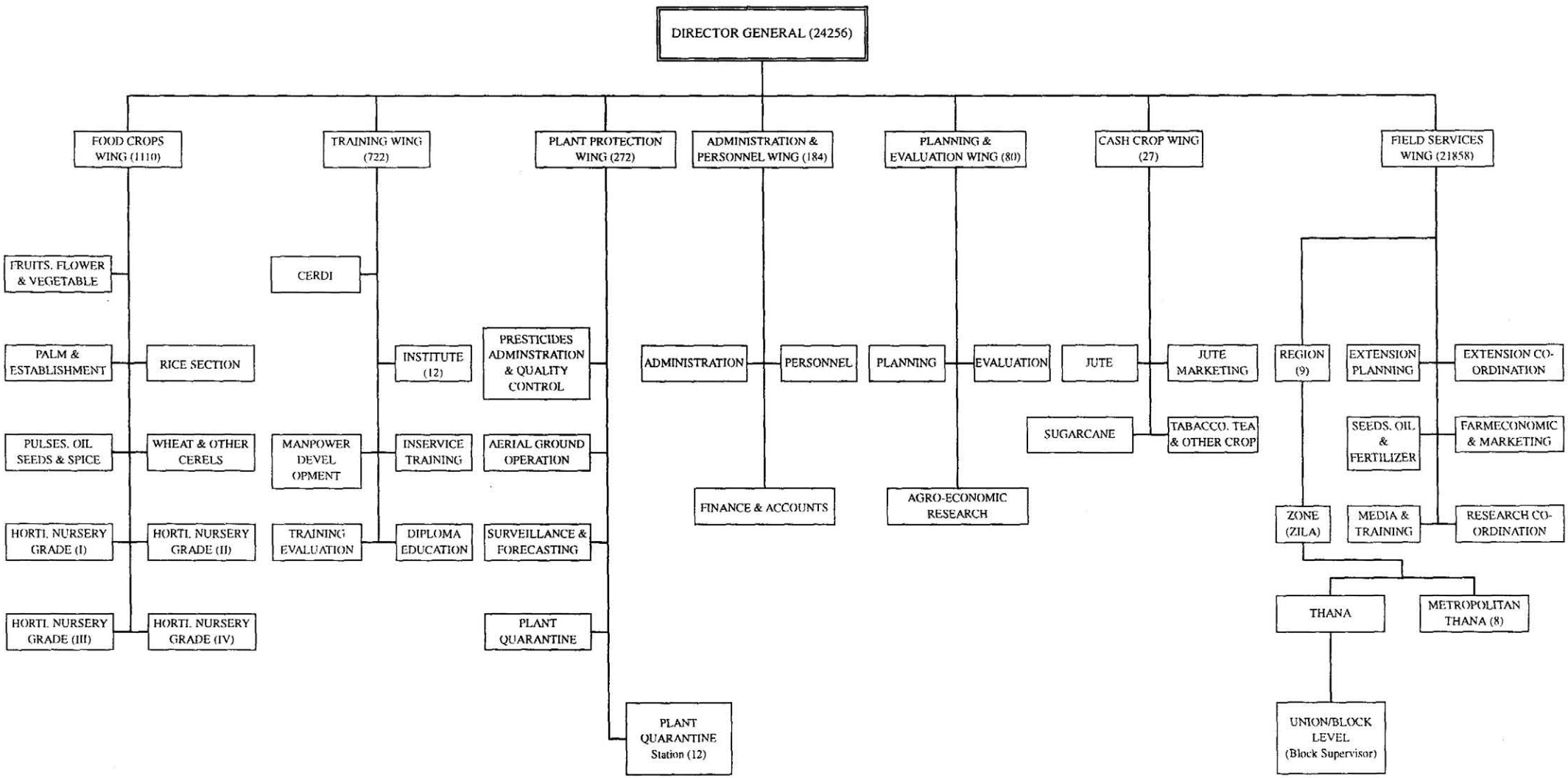


Fig. 4: Department of Agricultural Extension

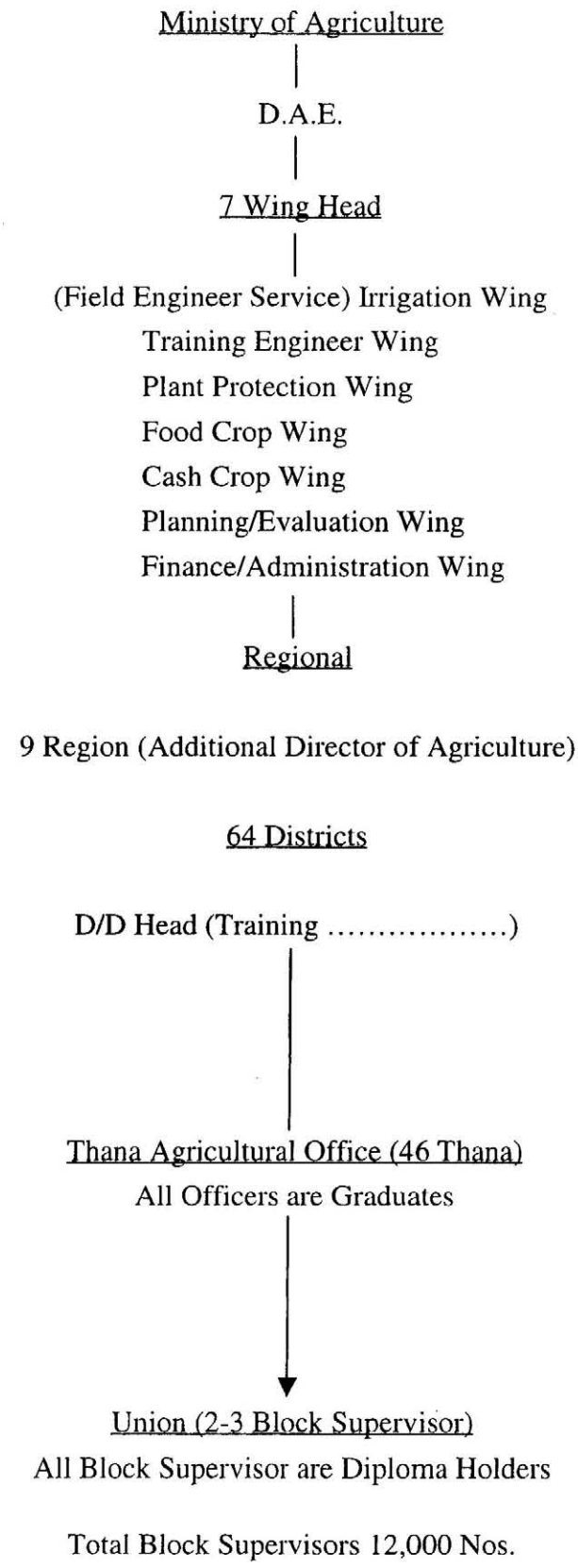


Table 1: Production of Selected Agricultural Crops

(million tons)

Crops	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
1. Foodgrains	18.75	18.86	19.32	9.52	19.72	18.09
(a) Rice	17.86	17.86	18.25	18.34	18.04	16.54
Aus	2.49	2.33	2.18	2.08	1.85	1.79
Aman	9.20	9.17	9.27	9.68	9.42	8.51
Boro	6.17	6.36	6.80	6.58	6.77	6.54
(b) Wheat	1.02	1.00	1.07	1.18	1.18	1.25
2. Jute	0.87	0.96	0.96	0.89	0.89	0.96
3. Tobacco	0.04	0.03	0.03	0.04	0.04	0.04
4. Sugarcane	7.42	7.70	7.45	7.51	7.51	7.45
5. Potato	1.07	1.24	1.38	1.38	1.44	1.47
6. Sweet Potato	0.51	0.48	0.47	0.43	0.43	0.44
7. Oilseed	0.43	0.46	0.48	0.48	0.47	0.48
8. Pulses	0.51	0.52	0.50	0.50	0.53	0.54
9. Vegetables	0.97	1.10	1.14	1.14	0.79	1.37
10. Spices	0.32	0.32	0.30	0.30	0.32	0.32

Source: Ministry of Finance, *Memorandum for the Bangladesh Aid Group 1996-97*, Dhaka: August 12, 1996, Table 2; and the Bangladesh Bureau of Statistics.

Table 2: Potential and Existing Yield of Major Crops

Yield in tons/ha

Crops	Experimental Stations	Demonstration Plots	National Average Yield
Rice	4.92	3.7	1.80
Aus	3.58	2.6	1.20
Aman	4.68	4.21	1.66
Boro	6.50	6.3	2.53
Jute	4.25	2.5	1.6
Cotton	2.05	1.8	0.806
Sugarcane	322	100	40.67
Wheat	4.0	3.0	1.84
Pulses	1.9	1.5	0.73
Mustard	1.6 - 2.4	1.4	0.84
Maize	3.0	3.0	1.06
Potato	26.35	22.5	10.68
Onion	16	9.0	4.0
Banana	37.20	25.00	16.4
Pineapple	968	47.50	10.6
Silk Cocoon	600 - 800 metre	500 - 600 metre	Less than 500 metre per cocoon

Note: National average crop yields are from BBS, 1994.

Source: M.A. Hamid Miah, "Agricultural Research Strategy and Participatory Approach." Paper presented at the MOA/World Bank Workshop on Bangladesh Agriculture in the 21st Century, November 5-6, 1995, Table 1.

Table 3: Areas with Irrigation Facilities and Annual Growth Ratesof Irrigation Command Areas 1982-83 to 1994-95[1/]

Area in Thousand Acres

	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	Compounded growth rates, %
A. Irrigation Command area, acres x 1000														
1. Groundwater wells														
a) Shallow tubewell	918	1,186	1,449	1,449	1,580	1,861	2,326	2,563	2,665	3,049	3,440	3,429	3,987	
b) Deep tubewell	579	650	709	751	785	852	940	949	903	1,072	1,079	962	1,127	
c) Manual pumps	(40)[2/]	(40)	(40)	(40)	(40)	(40)	(40)	(40)	45	46	55	71	70	
Sub-total	(1,537)	(1,876)	(2,198)	(2,240)	(2,405)	(2,753)	(3,306)	(3,552)	(3,613)	(4,167)	(4,574)	(4,462)	(5,184)	
2. Surface Irrigation Schemes														
a) Low-lift pumps	833	845	868	880	953	993	1,192	1,196	1,268	1,236	1,226	1,132	1,208	
b) Traditional	(1,002)	(920)	(949)	(776)	(806)	(1,071)	(967)	(1,181)	1,231	782	798	860	708	
c) Canal (major)	396[3/]	337	364	403	384	284	419	436	427	427	427	427	427	
Sub-total	(2,231)	(2,102)	(2,181)	(2,059)	(2,143)	(2,348)	(2,578)	(2,813)	(2,926)	(2,445)	(2,451)	(2,419)	(2,343)	
Total	3,768	3,978	4,379	4,299	4,548	5,101	5,884	6,365	6,539	6,612	7,025	6,881	7,527	
B. Annual growth rate in command areas, %														
a) Shallow tubewells		29.1	22.0	0.0	9.0	17.8	25.0	10.2	4.0	14.4	12.8	-0.3	16.27	13.0[4/]
b) Deep tubewells		12.3	9.1	5.9	4.5	8.5	10.3	1.0	-4.8	18.7	0.7	-10.8	17.15	5.7
c) Manual pumps										2.2	19.6	29.1	-1.40	4.8
d) Low-lift pumps		1.4	2.7	1.4	8.2	4.2	20.0	0.3	6.0	-2.5	-0.8	-7.7	6.713	3.1
e) Traditional		-14.9	8.0	10.7	-9.7	-26.0	47.5	4.1	2.1	-36.5	2.0	7.8	-17.6	-2.9
f) Total command area		5.6	10.1	-1.8	5.8	12.1	15.3	8.2	2.7	1.0	6.3	-2.1	9.388	5.9

1 acre = 0.405 ha.

1/ 1994-95 Preliminary Results. DAE/ATIA Census and Survy
1991-92 to 1993-94. AST/DAE National Census and Survey Reports
1982-83 to 1989-90 Adopted from ATIA Field Document No.26

2/ Areas enclosed in parenthesis are inferred values resulting from roughly assumed tubewell areas

3/ Rough approximations, partly based on BBS data

4/ Compounded annual growth rates

Source: "Project Findings and Recommendations", Assisting Transformation to

TERMS OF REFERENCE

FOR

THE STUDY

ON

THE SUSTAINABLE INTEGRATED AGRO-FORESTRY DEVELOPMENT

IN CHITTAGONG HILL TRACT (CHT)

(DRAFT)

July, 2001

MINISTRY OF CHITTAGONG HILL TRACT AFFAIRS
MINISTRY OF AGRICULTURE
PEOPLE'S REPUBLIC OF BANGLADESH

TERMS OF REFERENCE
FOR THE MASTER PLAN STUDY ON
SUSTAINABLE AGRICULTURAL DEVELOPMENT IN CHT
OF THE PEOPLE'S REPUBLIC OF BANGLADESH

Project Title	: The Master Plan Study on Sustainable Agricultural Development Project on Chittagong Hill Tract
Location	: Chittagong Hill Tract, Bangladesh
Requested Agency	: Ministry of Chittagong Hill Tract Affairs/ Ministry of Agriculture
Proposed Source of Assistance	: Government of Japan
Desirable Time of Commencement	: As soon as possible

1. BACKGROUND

Bangladesh has a total area of 143,998 sq km. It is surrounded to the west, north-west and east by India, and shares a south-eastern border with Myanmar for 283 km. To the south is the Bay of Bengal.

The Topography is characterized by alluvial plains, bound to the north by the submontane regions of the Himalaya; the piedmontane areas in the north-east and the eastern fringes adjacent to Assam, Tripura and Myanmar are broken by the forested hills of Mymenshingh, Shlhet, and Chittagong Hill Tract. The great Himalayan rivers e.g. the Ganges and the Brahmaputra divide the land into six major regions which more or less correspond to the six administrative divisions. North-west (Rajshahi), south-west (Khulna), south central (Barisal) belong to the Gangs floodplain. Central (Dhaka), north-east (Sylhet) and south-east (Chittagong) belong to the non-Ganges floodplain, piedmont floodplain terrace lands and the hilly lands.

The climate of Bangladesh is subtropical and tropical with temperatures ranging from an average daytime low of 21 °C in the cold season to a top of 35 °C in the hot season. Annual rainfall varies from 1,000 mm in the west to 2,500 mm in the south-east and up to 5,000 mm in the north rear the hills of Assam.

Agriculture is the largest sector in the Bangladesh economy. It accounts for one-third of GDP and provides employment to two-thirds of the labour force. A well performing agriculture sector is crucial to economic growth, poverty alleviation and nutritional improvement of the population. Access of the rural poor to food is

considerably determined by what happens in the food economy, specially through the demand for labour in food production and the price of food. The latter greatly influences the rate of inflation due to the high share of food in consumer expenditure in the country. Bangladesh has three cropping season e.g. Rabi, Kharif-I and Kharif-II based on the temperature and moisture regimes.

Bangladesh have a good potential for agricultural development and for achieving self-reliance in food. It is endowed with good soil and ecological diversity and vast untapped, partly tapped surface and groundwater resources for irrigation development. The country has made steady progress in agriculture in the post-Independence period. Between 1969 and 1993, the cropping intensity increased from 148 to 179 percent and food grain production almost doubled. During 1980 - 1993, rice production grew at 2.66 percent per annum, higher than the rate of population growth. Just a few years ago, the country showed that it could produce enough food grains and even a small surplus of rice in a normal crop year.

The agriculture sector, however, has failed to exploit its full potential for crop production. As a result, Bangladesh has been a net importer of food despite its comparative advantage in producing a number of crops both for domestic consumption and export. Poor nutritional indicators point to significant gaps in food consumption with serious implications on the country's future development. Apart from the severe land constraint, there are several technological, institutional, infrastructural, social and policy constraints holding back the performance of the agriculture sector. Available projections indicate that the country may remain a food importer unless the constraints to productivity growth are addressed in time.

Farmers in general lack the skill on soil, fertilizer, water and crop management. Several issues confront the agriculture sector in Bangladesh; foremost is the low and stagnating yields of most crops, including rice. Although the adoption of modern varieties has increased, yields have fallen in recent year. The main reasons for this are that the supply of high quality seed is grossly inadequate and the modern variety seeds used in Bangladesh are losing their vigor. Moreover, the expansion of minor irrigation has slowed down and the timely availability of fertilizer at farm level emerged as a problem occasionally. The unbalanced use of fertilizers and depletion of organic matter in the soil is affecting soil fertility on a long-term basis. A combination of these factors has led to the persistence of instability in the level of output. Thus, accelerating crop productivity and sustaining the growth of output are the major challenges for agriculture sector.

The second issue is of crops diversification for its contributions to enhancing farmers income and nutritional balance, diversifying farm products and by-products in support of agro-industries, enhancing the biological stability and productivity of cropping systems in lands marginally suited of rice, and improving soil quality and production capability. Moreover, accelerated growth in rice production will be difficult to sustain without crop diversification due to the problem of disposing a surplus rice output and the consequent price collapse observed in the aftermath of the recent-years' bumper Crops.

The third issue is the impact on environmental sustainability of agricultural development. There are signs of increasing land erosion, soil degradation, water logging and salinity problems. The water table is declining in several areas. Lack of appropriate technology and the capacity to invest in preserving the environment are all at work. preventive and mitigating measures need to be undertaken immediately. Conflict of land uses and fanny water management effected agriculture, fisheries livestock as well as the environment severely.

The fourth issue is the question of using agricultural growth as the major instrument of poverty alleviation, improved nutrition and food security for the poor. While in the small farmer-based agricultural system of Bangladesh, agricultural growth is inherently beneficial to the poor, enhancing the productivity of the lands and crops grown by the poor and intensifying the farm-non-farm sector linkages through rapid agro-industrial development based on indigenous products would hasten the progress in poverty alleviation.

2. PRESENT CONDITIONS OF AGRICULTURE AND CONSTRAINTS FOR DEVELOPMENT WITH EMPHASIS ON CHITTAGONG HILL TRACT (CHT)

2.1 General

Being an agriculture-dependent economy with a growing population and having one of the world's lowest land/man ratio, the most important issue in Bangladesh agriculture is to enhance and sustain growth in crop productivity.

There are side gaps between the potential and the realized yields for all crops in Bangladesh. Studies indicate that the yield potential of the existing HYVs of rice is more than 4.0 tons/ha milled rice (or 6.0-tonne/ha rough rice), whereas the average yield of the majority of farmers is only about 2.0 tons/ha. The gap is even greater in wheat. The yield potential of the HYV wheat is about 4.0 tons/ha while the average

yield in farmer's fields is 1.8 tons/ha. Of course, the climatic conditions of Bangladesh e.g. temperature regime and delayed draining of flood water in the floodplain area poses severe limitation for research to the high yield. Level of wheat.

Thus, the foremost priority for Bangladesh is to accelerate and sustain food grain productivity growth by closing the yield gaps and increasing the cropping intensity. The Government has appropriately included this objective in declaring food self-sufficiency and self-reliance in food as the short-term and long-term goals for the agriculture sector.

The second issue confronting Bangladesh agriculture is **crop diversification**. With rice occupying almost 75 percent of the cropped area followed by wheat (4 percent), only about 21 percent of the cropped area is devoted to other crops.

Third, the issue of **environmental sustainability** of agricultural development is important of Bangladesh. Signs of land degradation resulting from imperfect cropping and soil management are already noticeable. Scientists have estimated that about 32 percent of net cultivated land suffer form salinity problems. Another 12 percent of the country's area (hilly lands) is vulnerable to erosion. More than half of the cultivated area has inadequate drainage and suffers from water logging and poor aeration. Increasing ground water utilization is already leading to declining water table in some areas resulting in inoperative shallow tube-wells, decrease in the dry season flows of waterways, increased salt water intrusion in coastal areas, induced exploitation of aquifer irrespective of the recharge which increases the risk of groundwater pollution, and degradation of aquatic resources.

Fourth, as and agricultural development strategy for Bangladesh should tackle the interrelated issue of **poverty alleviation, malnutrition and food security** because of their close linkages with the state and performance of the agriculture sector. About 50 million people are categorized as poor in Bangladesh, where poverty is manifested in several ways, including low income, inadequate calorie intake, poor health, low level of educational attainment, and limited access to social service. Due to a severe land constraint, low yields and increasing population pressure, most producer households are net buyers of food. The incidence of hard-core poverty (defined on the basis of calorie consumption below 1,805 kcal per day) is higher amount agricultural compared to non-agricultural households. Reduction in poverty is critical to food security. Moreover, enhancing the ability to buy food contributes to the sustainability of accelerated growth in agriculture.

An agricultural development strategy of Bangladesh must explicitly consider its implication on reducing poverty and specifically propagate technology and promote investment to improve the productivity of the crops and lands cultivated by the poor. It should also enhance the returns to labour. This would need a balanced emphasis on the development of prime lands as well as marginal lands, and of rain fed technology for crops grown by the poor. Since small and marginal farmers the bulk of the poor, agricultural strategy must be geared toward improving the productivity of such farms.

2.2 Chittagong Hill Tract, Agriculture Development and the Constraints

2.2.1 General

The Chittagong Hill Tract (CHT) region is an overall food deficient area. Nearly 1.2 million people of CHT depend on 30,000 ha of valley land and another 40,000 ha of jhum land for production of grains needed at present. The population in CHT increased rapidly by migration and new birth, after signing of the Peace Accord in December 1997. This, because of unavailability of plain agricultural land, has put more pressure on expansion of shifting cultivation area on hill slopes that consequently has shortened the fallow period between the two subsequent jhum cycles. As a result both the natural forests of CHT as well as the fertility of hill soils are getting degraded rapidly. Other constraints include eco-degradation, land erosion, land conflicts, population pressure, terrain condition, etc.

The situation is alarming, because of the overall need for food and other agriculture commodities in CHT increasing fast due to (i) increasing population, (ii) improvement in live quality, (iii) development of road infrastructures, etc. One the other hand, land quality both agricultural land and forest land degrading rapidly due to over exploitation. Hence, GoB as a policy has decided to augment productively per unit area both from forest and agriculture lands. This is mainly because of the limited availability of land suitable for sedentary agriculture.

The CHT region remained locked in a bloody war caused due to ethnic distrust between the indigenous hill people and the plain land Bengali people. As a result CHT was deprived of the usual development activities compared to the plain land area since the past two decades. The situation has changed abruptly and favourably after signing of the Peace Accord.

2.2.2 Land Classes

Table 1 shows the overall percentages of the different land classes in CHT, excluding the reserved forest according to the slope-based classification proposed by Forestal (1966) and Brammer (1986) Hassan (1999).

Table 1 : Land Classes in the CHT

Land class	Slope (%)	Land in CHT		
		%	Area (ha)	Landuse Limitations
A	≤ 5	3.1	30,969	Few limitations
B	5 - 20	2.7	27,488	Moderate limitations
C	20 - 40	14.7	148,482	Severe limitations
D	> 40	73.0	735,482	Very severe limitations
C - D	40 - 50	1.3	12,970	Complex of C and D
Settlement & Water		5.3	53,535	Slopes

Source : Forestal (1966) and Brammer (1986)

Steep ness of slopes depends on the spacing between successive ridges and on nature of the rock types. Spacing decreases and slope steep ness increases from west to east. Because of the location of CHT relative to the folds, the narrowly spaced ridges with steep slopes occupy only a relatively small area on the north-eastern side and a large area of the southern side (Bandarban). On a micro scale, steep ness of slope is also affected by the occurrence of hard sandstone embedded in the predominant softer shales. Sandstone results in steeper slopes than shale.

2.2.3 Climate

A warm wet monsoon season from April to October and a cool dry season from November to March characterize the climate in the Hill Tracts. Table below shows the average monthly rainfall for Rangamati and Kaptai (1960 - 1980) and average monthly temperatures and evaporation for Rangamati (1999). Total rainfall increase considerably from north to south, from about 2,000 mm in the northernmost part to 3,759 mm in the most southern point of the CHT. The two stations of Table 2 are intermediate.

Table 2 : Average Climatic Data for Rangamati and Kaptai

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Rangamati	3	13	33	79	235	281	613	382	282	176	35	22	2,359
Kaptai	5	19	23	111	264	624	713	432	354	253	66	25	2,889
T_{max}	28	32	35	36	32	31	31	31	32	32	30	27	-
T_{min}	13	16	20	25	25	25	25	25	24	24	19	15	-

2.3 Agricultural Production

2.3.1 Overall Land Use

The major components of the agricultural production systems in the Hill Tracts are:

- Jhum, or hill side shifting cultivation
- Valley bottom and piedmont cultivation
- Perennial crop and timber production

There is large variation in physical and socio-economic conditions across the CHT region, which is mainly related in the relative importance of each of these components.

The valley piedmont and hill areas all three components may occur within a short distance at different positions in the topography, but they do not usually form a farming system in the sense of an integrated set of components operated by the same household. It is rare to find farms where these three different components occur side by and side managed by the same farmer, except in the settlement schemes.

In the low hill areas, agriculture is essentially rain fed hill farming, although small inland valleys may occur which are suitable for wetland cropping. In most of the high hill areas most valleys are V-shaped and valley bottomland occurs more sporadically. Hill farming is practiced on steep to very steep slopes.

The Jhum Area (shifting cultivation)

The Department of Agriculture Extension (DAE) do not consider jhum as a separate category, rice produced by jhum being subsumed under Aus paddy. However, data only seem to be collected by DAE from flat and foot slope land, so there are no real statistical data on the extent of jhum cultivation. A rough estimate on the basis of available data that can be made is nearly 40,000 hectare with a rotation cycle of 4 - 5 years involving nearly 2,00,000 hectare.

Total indigenous population of the Hill Tracts is now about 550,000. With an average family size of 5.5 comprising 100,000 families. Assuming that 10 % live in urban areas, 10 % of the rural households are not engaged in agriculture and 10 % of the remainder rely exclusively on forms of agriculture other than jhum, there are an estimated 73,000 jhumia households.

According to the Forestal report, only 3.1 % of the land outside the forest reserves consists of valleys and immediately adjacent foot slopes (land class A slopes < 5 %), including small inland valleys. This represents about 31,000 ha.

The Perennial Crop Area

Fruit trees like mango, jack fruit, coconuts, guava, lemon orange grow in homestead area particularly in the Bengali settled homesteads. Pineapple and banana are cultivated around the 'Jhum' fields Broad, land utilization areas are:

- Reserve Forests 300,000 ha
- USF Forests 700,000 ha
- Rubber Plantation 2,000 ha
- Tea Plantation 1,000 ha

The Jhum System

Jhum is a controversial hillside production system based on shifting cultivation (also called shifting cultivation). It has been varyingly characterized as a system which is well adapted to humid forest conditions under low population density, to a system which is responsible for wholesale destruction of the remaining forest stocks. The contribution of jhum to deforestation has probably been exaggerated. Legal and illegal commercial logging since the middle of the last century has probably been a much more important factor in the loss of most of the original forest.

Rather than taking a *priori* stand on the merits and demerits of jhum as an agricultural production system it is useful to make a factual analysis of the system and its economic aspects. Obviously, it is not possible to do full justice to its complexity but it is felt that sufficient information is available to make an informed judgement on a number of aspects. It was looked upon at the original jhum system as described in Bangladesh District Gazetteers (1971), complemented with information from knowledgeable informants.

Crop Production in Valley and Foot Slope Land

Valley land of significant extension is concentrated along the flank of anticlines and associated with the larger rivers, especially in Khagrachhari and to a lesser extent in Rangamati and Bandarban districts. Most of the previous valley land in Rangamati, associated with the Karnaphuli river and its tributaries (22,000 ha) has been submerged by the Kaptai lake. This, along with the migrated population from the plainland area combined has turned the CHT area food deficient.

The production system in the major valleys is highly intensive and comparable with that in the Chittagong plain. Cropping patterns include:

Rabi crops - Aus - Aman
Rabi crops - Boro - Aman
Rabi crops - Aman
Fallow - Boro - Aman

The rice is the main staple crop while maize, Kasaba and ums are the supplementary ones. Aus covers an approximate area of 45,000 ha in Jhum and upper terraces, transplanted Aman 30,000 ha in valleys and Boro 15,000 hectare in fringe lands. There is also an increasing trend of maize cultivation in Jhum lands.

In addition, borders of the valleys and higher terraces along the streams are often in use for a variety of commercial crops such as sugar cane, 'false coriander' (Eryngium foetidum) grown under shade, long beans and gourds grown on semi-permanent trellises, Amorphophallus and Colocasia tubers are grown an hill slopes. The lower foot slopes are sometimes used for ginger and turmeric. This prime land is in use by both tribal and Bengali farmers.

Perennial Crop Production

A wide range of perennial crops is grown in the area, in particular in the lower strata of the topography e.g. Bangladesh Agriculture Development Corporation (BADC), Bangladesh Agriculture Research Institute (Bari), Chittagong Hill Tract Development Board (CHTDB) and Non-Government Organizations (NGOs).

Pineapple production has been and is being promoted by various organizations in the low and high hill areas. The crop is often seen on very steep slopes, planted in the direction of the slope and clean weeded, without any soil protection. Where it is promoted as part of a more integrated production system, measures are taken to prevent soil erosion by planting on the contours and intercalating strips of protective

2.4 Irrigation

Minor irrigation in Bangladesh rapidly grew from 1.36 million ha in 1982 - 83 to 2.87 million ha in 1994 - 95, or a compound growth of 5.9 percent per annum. This made it possible for Bangladesh to make a progressive shift from a high-risk monsoon dependent agriculture to low-risk agriculture based on irrigation. This growth, however, has not been steady. There have been fluctuations in the rate of growth and utilization of irrigation equipment in response to government policy changes or output price movement. For example, while the liberalization of trade and removal of siting restrictions and standardization requirements propelled rapid expansion in minor irrigation from 1986 - 88 to 1989 - 91. The rise in fuel price in the wake of Gulf War, withdrawal of subsidies and the reimposition of siting restriction caused a slowdown in 1990 - 91 and 1991 - 92. Similarly, the slump in cereal price in 1992 and 1993 led to another slowdown in its development in 1993 - 94. Future growth of minor irrigation will therefore largely depend on appropriate and timely adjustment of policies to further encourage private sector and individual farmers participation in minor irrigation development.

Bangladesh Agriculture Development Corporation (BADC) has invested substantial resources in a shallow and deep tube-well irrigation programme in the CHT region but with not much success. The Director, BADC, feels that this programme needs further examination. Power pumps were made available on rental basis at the fringe and riverside land for irrigation. It was said to be 'somewhat successful' in Boro cultivation. BADC thinks that this could be tried further. Particularly in the upper reaches of the parental water bodies for multiple uses e.g. irrigation, fisheries, duckeries and reservoir for collection of potable water and for production of winter vegetables. Rubber dams can replace the earthen dams that might be more convenient from economic and environmental viewpoints.

Use of ground water in CHT for irrigation might be expensive because of the non-availability of suitable aquifers within a depth of 200 - 300 m. Moreover, large patch of plain land to the extent of 50 hectare or more down not occur in the valleys.

The hill slopes can brown under extensive irrigation for the production of winter vegetables horticultural crops and maize provided sprinkling irrigation with low life pump can be arranged for using the lake water. The Rural Electrification Board (REB) can be utilized for this purpose.

Storage of rain water on community ownership during the rainy season can be utilized by the indigenous people living in remove hill slope villages for domestic purposes and for production vegetables and horticultural crops during the winter season.

Unlike the plain land districts there is little scope to use the grown water for large scale expansion of irrigated agriculture in CHT. The limitations for this include irregular relief of the valley lands, steep slope of the hilly lands and non-availability of suitable aquifers at shallow depth.

2.5 Agricultural Credit

The major part of the credit to farmers and fishers has been met by informal sources that usually charge very high interest rates. These sources provide primarily short-term production credit and are not generally effective in meeting the medium- to long-term credit requirements. The second major source of credit in the rural areas are the semi-formal institutions or NGOs (e.g. Grameen Bank and BRAC), which provide targeted credits to the poor rural households. Most of these institutions have a general orientation to poverty alleviation and, except the Grameen Krishi Foundation and Rangpur Dinajpur Rural Service, lend money to households owning less than 0.5 acres of land. The third source are the formal sources, comprising the nationalized commercial banks and agricultural and specialized banks, Bangladesh Krishi Bank (BKB), Rajshahi Krishi Unnayan Bank (RAKUB), and Bangladesh Samabasya Bank (BSB).

In recent years, there has been a drastic cut in the share of agricultural sector in the total credit delivery to the private sector from formal sources. This share declined from 16.4 percent in 1984 - 85 to 5.2 percent in 1993 - 94. In fact, the agricultural credit issued by the formal sector declined even in nominal terms from Tk. 11,317 million in 1984 - 85 to Tk. 11,008 million in 1993 - 94. The major reasons for this are low repayment due to law lending and recovery operations, inappropriate use of loans and widespread default.

The low repayment of agricultural credit may partly be traced to the recurrent crop losses suffered by farmers as a result of climatic uncertainties and natural disasters. A recent ADB supported study on the feasibility of a crop insurance scheme has been recommended. The crop insurance development programme to be undertaken in three phases, namely: (i) technical assistance to develop and initiate crop insurance, (ii) start-up of the agricultural insurance consortium and (iii) continuing evaluation of applications.

There are tree types of agencies from where agricultural credits in Bangladesh are available as stated above. Traditionally, the CHT people are exploited extensively by the informal creditors. The NGO's activities are limited in CHT due to ethnic unrest that engulfed the area since the past two decades. The indigenous people and the poor Bengali people as well have only limited excess to the formal sources of for obtaining agricultural credits.

2.6 Agro-Processing

Bangladesh experience a seasonal surpluses in several perishable agricultural commodities. Development of agro-processing facilities can reduce the post-harvest losses and enhance formers' income. The agro-processing industries are in the initiation stage of development. Most of the technologies and facilities for handling, storage, processing and packaging of farm products and by-products are substandard and outdated.

Policies for food processing industries in Bangladesh are a part of the new Industrial Policy (1991) which has the broad objective of developing a competitive market economy. Indeed, the greater emphasis on crop diversification should pave the way for and efficient, market-oriented agro-industrial development and vice versa. To make land available for cultivation of diversified crops production per unit area shall have to be increased with the application inputs in the form of technology and management. Just as the role of CHT region in horticulture fresh product marketing and production so far unsatisfactory and marginal so is its presence in the processing industry. The indigenous people by sun drying and applying some indigenous methods preserve fruits and vegetable in very small quantities for family consumption. These include drying up of ginger, chilly, pea, turmeric, etc. Preservation of different fruits like green mango, lemon, olive, etc as chatni and marmalade (pickle) is also practiced as household operation; but not as commercial venture.

As regards processing industry in the CHT region and its neighboring areas the main facility to process pineapple is the one that belong to the Muktijoddha Kalyan Trust an outfit of ministry of defense. The plant, was established in 1983 in Chittagong is not considered to be in good shape and cost effective. The plant remains as abandoned, became efforts at its renovation are considered to be more expensive than building a new plant.

Another private owned processing unit "Rangamati Food Product Ltd" located at about 15 km north of Rangamati on Rangamati-Chittagong road has been processing a

very small quantity of pineapple slice and juice. 0 This plant has practically gone sick. Only 15 % of the rated capacity of plant (500 MT) is currently being utilized although there is no dearth of raw materials in the area during season. There are practically no major units to process vegetables at present except a few small Chilly, turmeric and coriander seeds and grinding factories.

2.7 Market Potential

Those crops will have the best opportunities for the national market, which can be grown in the CHT at a time when they are in short supply in the plain area, because they would capture a price bonus. In the plain, the major seasons for all crops except rice are the Rabi (winter) and Knari-1 (pre-monsoon) season. During the monsoon production of non-rice crops is limited to the homestead area. We therefore looked for those crops that are grown only during Rabi and pre-monsoon in the plain area and which may be grown in CHT hills during the monsoon are consumed widely but are grown only at a small scale in the homestead during the monsoon in the plain

2.8 Rural Infrastructure

The development of rural infrastructures and the growth of agriculture are interlocked. Good infrastructures, such as road and water transport network, promote agricultural optimal level. In this regard, market imperfections must be tackled by improving infrastructure, access to information, technology and credit as well as appropriate changes in the rules and regulations governing business transactions. Moreover, the public sector must provide public goods and services that could not be efficiently supplied by the private sector, support development of technical know-how, and promote access to foreign markets, technology and capital. Finally, the public sector has to establish effective legal framework, provide phyto-sanitary and quarantine services, set product standards and test and certify product quality, and encourage sustainable use of natural resources.

The CHT has a small population of nearly 1.2 million spread over an area of 13,295 km^2. The roads already constructed by Roads and Highway Department (RHD) (1,040 km), Local Government Engineering Department (LGED) (6,680km) and CHTDB (130 km) total 7,850 km. The district and upazilla townships area interconnected with the trunk roads by all weather metalled roads. In addition, many new roads are being constructed to establish linkage between the Growth Centers and Growth Centers, important villages and between Growth Centers and villages.

The special terrain conditions of CHT indicate that road transport is likely to remain as the main mode of transportation in this region excepting the lake areas. Road construction is difficult and expensive in the hilly landscape. Moreover, each km road construction might involve 20 - 30 hectare land loss, loss of forest and bio-diversity, promote erosion and consequent sedimentation in the down slope region that might choke the channels and creeks and effect the surface drainage. The opening up of road communication to the high forest zone that still present as remnants in the less accessible remote areas will expedite the forest denudation process, deplete bio-diversity and consequently degrade the ecology of CHT.

Construction of road by hills cutting also conflict the Hill Cutting Prohibition Act 1986. Large-scale hill cutting might create hydrostatic imbalance in the region and favour increased run-off from watersheds. All these coupled with the unconsolidated state of the slowly permeable parent rock of the hill system, steep slope and high seasonal rainfall might cause large-scale land-slide along the road cuts. This is already happening along the existing road infrastructure. Total road length in CHT is shown.

Table 3 : Existing Road Network in Three Districts of CHT (km)

Agency	Rangamati District	Khagrachhari District	Bandarban District	Total
RHD	163	590	287	1,040
LGED	2,915	1,746	2,019	6,680
CHTDB	130	-	-	130
Total	3,208	2,336	2,306	7,850

However, the road infrastructures need of the coming decade for planned development of CHT have been worked out comprehensively under the ADB funded Feasibility Report, 2001. The Kaptai lake has also opened up large area of the CHT to water transportation system that is gaining popularity amongst rural people.

2.9 Woman in Development

The women in Bangladesh constitute a significant portion of the labour force (43 percent in 1989). They are also very active in agriculture. Gender desegregation of key human well being, women in Bangladesh are worse off compare to the men. Over 95 percent of the female-headed households fall below the poverty line. The incidence of malnutrition among children is higher among girls. Death of children

aged 1 - 4 years is 23 percent higher for girls than boys. The women have lower adult literacy rates and they are often paid lower wages. The Government of Bangladesh (GOB) has assigned a high priority to the development of women as a disadvantaged section of the population. This policy is reflected in activities in both economic and social sectors with some improvement in certain social indicators such as adult literacy.

Typically there is a gender division of work in CHT. Major day-to-day decisions are generally made in some form of consultation between the active (adult) members of the household, including the male head (father, elder brother, or son), the key female figure (wife or mother of the head of the household) and other earning members. In most cases, the consultation mainly occurs in the leisurely family sittings immediately after the supper at night. At times, important relatives and neighbors are also invited in to participate in the discussion leading to decisions about major family events, especially marriage or acquiring of landed assets. The commonly observed decision areas include selecting of jhum site; determining the type, quality and quantity of seedlings; selling varied agro-forestry products; time and amount of household savings; time, heads and amount of major family expenditure; tending operation in the gardens; marriage; attending in socio-religious festivals and events; social visits to patrons, friends and relatives; buying landed properties; choice of doctors, medicine, location of treatment; repairing and renovating huts, livestock, sheds etc.; source, time and amount of loan and repayment; talking to outsiders; adopting particular strategies in the face of natural calamities (e.g. cyclones, draught); joining external organisations (e.g. cooperatives voluntary associations, government agencies). Compared to other plain land districts the CHT women folk are more actively involved in agricultural and social activities.

2.10 Land Reform and Tenure System

With a per capita net-cropped area endowment of 0.0064 ha in 1992 - 93, Bangladesh has one of the highest densities of population on land in the world. The average size of land holding is declining due to the inheritance laws under which the land is divided equally among the sibling and the need to construct houses for the growing population. In this extremely land-scarce situation, the present ceiling on land ownership in Bangladesh is 3.37 ha. However, the state of land records makes it very difficult to verify how much land an individual really owns. Sharecropping and some of the owners have to reside in distant towns to earn additional income.

The Land Reform Ordinance of 1984 has provision for the protection of tenants and share-croppers. The basic issue, however, is the lack of enforcement of the Ordinance. In many areas, most farm holdings are small, and large landlords are virtually non-existent. Thus there is very limited scope for comprehensive redistribution of land. Reducing the ceiling of land ownership is not much relevant to Bangladesh. The legal difficulties it will create would offset expected benefits. In any case, it is politically unacceptable and costly to implement.

Land tenancy and ownership system in CHT are different from that of the plain land districts. The already complicated land tenancy system of CHT became more complicated due to negligence of the land Ministry, corruption of involved individuals and politicization of the land issues over the pasts two decades. Customarily, land in CHT is controlled by the District Commissioners (DCs). The DCs on recommendation of local headmen and tribal chiefs lease out the khas land to individuals of indigenous community for settlement, agriculture and for other type of uses for a specified period. Government revenue is collected from the indigenous people through the headmen and tribal Chiefs. The land in CHT was allotted to the plain land for settlement though an amendment of the Rule 34 of the CHT Manual 1900 in 1979 by passing the customary tradition. At present, ownership and tenancy of different land use types are designated as (i) owned (ii) leased (iii) khas and (iv) unspecified. The possessors of owned category land have legally valid documents of ownership; the leasees are in possession of valid lease documents from the district authority. The occupants of khas land and unspecified land have either no valid tittle documents in possession. The in most cases have records of occupation in headmen's registrar only. The headmen's registrar is in reality in ill maintained record occupation in headmen's registrar only. The headmen's registrar is in reality an all maintained record book based on that land dispute settlement might be difficult and complicated.

The land tenancy and ownership problem in CHT has complicated further since the past several decades, because of the settlement programme of government. Many opportunists took advantage of the inherent weakness of the land tenure practice, boundless corruption of government officials, political disturbance, migration of large number of indigenous people to India manage to obtain lease of vast land area in CHT. GoB policy of large-scale settlement of plain land people in CHT lands, which were otherwise in possession of the indigenous people for Jhum cultivation over the decades, favoured the opportunists. All these, combined have put the land tenancy

and ownership problem in the crux of all problems. The peace Accord on totality might be workable through resolving of the land-related issues nationally.

Land Commission (LC) has been constituted to settle the land-related issues as per the provisions of the Peace Accord signed in December 2, 1997. The LC is yet to begin function. However, to ensure effective implementation of the decisions and recommendations of LC some kind of crush programs on cadestral survey, rehabilitation and resettlement should proceed simultaneously without with any lapse. However, representatives of the indigenous communities prefer holding of the cadestral survey of CHT after resolving of the land dispute by LC. They apprehend that holding of cadestral survey before resolving the land issue.

2.11 Institution Issues

Eleven different indigenous tribes inhabit the CHT area. Large-scale resettlement of Bengali people began since 1979 complicated the problem further. The region continues to maintain its separate administrative status. Three parallel or sub-parallel administrative institutions of CHT include:

- Customary Rulers - by the tribal chiefs
- Government of Bangladesh Administration - District Commissioner, Thana Nirbahi Officers.
- Local Government Institutions - Elected Bodies e.g. MP, Union Council Chairman, Member etc.
- CHT Development Board - Statuary Body.

In addition, there are officials of the line Ministries e.g. Agriculture Dept., Fisheries Dept., Livestock Dept., Forest Dept., etc. these are involved in different development activities in their respective fields. As per the conditions of the 'Peace Accord' the GoB has enacted lows to empower the CHT Regional Council with the authority to supervise activities of the CHTDB, District Councils and activities of the departments under all the line Ministries. The newly established Ministry of Hill Tract Affairs controls the Regional Council and the District Councils. Hence, to maintain conformity with the policies of GoB and at the same time with the preference of CHT people, future development projects may be implemented by the CHT Affairs Ministry.

3. REQUIRED TECHNICAL AND FINANCIAL COOPERATION

Bangladesh has embarked on a historic and difficult economic transformation and agro-forestry reform. Japanese technical and financial cooperation can ensure that this reform process is successful and contribute for increased agricultural production in Bangladesh. In particular, cooperation is urgently needed for the integrated agro-forestry development in CHT for the following actions.

(1) Formulation of a master plan for the sustainable integrated agro-forestry development in the CHT of Bangladesh.
(2) Preparation of suitable land use plan based on the land suitability.
(3) Establishment of effective agro-forestry input supply and product marketing system.
(4) Modernization of agro-forestry supporting services such as seed industry, agro-forestry processing and machinery maintenance.
(5) Design of efficient agro-forestry finance system benefiting private farmers.
(6) Promotion of environmental friendly agro-forestry methods.
(7) Controlling the use of agricultural chemicals; reducing the overgazing and reversing the land degradation due to cultivation.
(8) Establishment agro-forestry statistical services and modernization of agro-forestry education, research and extension services.
(9) Training of professionals in agro-forestry research, extension and administration.

4. OBJECTIVES

Based on the above background, the major objectives of the Study are defined as follows:

(1) To conduct a Master Plan Study in the CHT of the People's Republic of Bangladesh to identify the major problems and the respective projects which can tackle and mitigate these problems for the sustainable integrated agricultural development (Phase I Study)

(2) To divide and prioritize the projects according to the necessity of the project for the development of the area and select the pilot project(s) which have higher priority and feasibility to be implemented (Phase I Study)

(3) To Analyze the feasibility of the selected pilot projects identified through the Master Plan (Phase II Study)

(4) To make technology transfer to the counterpart personnel and to the farmer leaders of the Study Area through out the course of the Study

5. PROPOSED STUDY AREA

The Study area shall cover the CHT of the People's Republic of Bangladesh with an area of approx. 13,295 sq.km. The Study Area is shown in Fig. 1.

6. SCOPE OF THE STUDY

The study shall comprise of two phases; i.e., Phase I and Phase II.

6.1 Master Plan Study (Phase I Study)

The Master Plan Study for the proposed Study Area will be Conducted to study the existing conditions and to identify suitable countermeasures and the projects which can eliminate or lessen the major constraints which restrict the atro-forestry development. The sustainable integrated agricultural development projects will be formulated and the pilot projects will be selected for the next stage of the Feasibility Study. For this purpose, the following works shall be carried out in association with the related agencies.

(1) An extensive inventory survey shall be carried out throughout the People's Republic of Bangladesh to collect and review the data and information and to analyze the existing conditions.

(2) Basic data and information

Apart from the above data the following information shall be collected on the following aspects of the Study Area.

1) Natural conditions including topography, geology, meteorology, hydrology, water quality etc.

2) Social conditions including population, social organizations, education, land tenure, employment, socio-economy etc.

3) Agro-forestry conditions including soil, land use, soil erosion, soil salinity, farming practices and cultivation techniques, crops and yields, extension, animal husbandry, livestock protection etc.

4) Conditions of agro-forestry infrastructure facilities including irrigation and drainage, farm roads, agro-forestry processing marketing facilities etc.

5) Conditions of social infrastructure facilities including transportation, domestic water supply, rural electrification, sanitation, social welfare etc.

6) Agroeconomic conditions including production cost, farmer's organizations, cost benefit, socio-economy etc.

7) Environmental Aspects.

(3) Review of existing development plans in the Study Area

(4) Analysis of the major constraints which restrict the development of the area

(5) Identification of suitable countermeasures and the projects to eliminate or lessen these constraints

(6) Classification of areas according to the similarity of constraints for development

(7) Formulation of sustainable integrated agro-forestry development programs based on the above data and information. The development programs will be formulated considering the following aspects:

1) Formulation of Basic Agricultural Development Plan including the land use plan for CHT.

2) Identification of area-wise priority projects which include various components of the countermeasures which can solve or migrate the constraints of development as mentioned below:

3) Agricultural development and improvement including farming techniques, agricultural extension, agricultural processing, marketing, and farming organizations

4) Restructuring and development of agricultural infrastructure facilities with respect to water resources, on farm irrigation system, drainage, land conservation etc.

5) Development of social infrastructure facilities such as rural roads, domestic water supply, sanitation, rural electrification etc.

6) Other necessary components of the projects pertaining to each selected area

(8) These projects shall be prioritized according to their necessity and importance and selection of pilot project(s) for the Phase (II) Study shall be made.

(9) Based on the necessity of the pilot project(s), detailed topographical and land use surveys shall be carried out in the selected areas and the maps shall be prepared.

6.2 Feasibility Study (Phase II Study)

Technical and economical feasibility of the selected pilot project(s) shall be carried out covering the following aspects:

(1) Intensive surveys in the priority areas and collection of data and information necessary for the feasibility study

1) Meteorological, hydrological and water quality survey
2) Soil, agronomical and land use survey
3) Survey of irrigation and drainage systems and on-farm irrigation, drainage facilities and land conservation facilities
4) Livestock survey
5) Survey of agro-forestry processing, and agro-industry
6) Survey of rural infrastructure including domestic water supply, sanitation, rural electrification etc.
7) Marketing and social infrastructure survey

(2) When experimental facilities are required for collecting the necessary data and information for these projects, construction and monitoring of the experimental facilities shall be carried out. The experimental facilities shall cover the following aspects:

- Experimental facilities to explore and analyze the possibility of using farm & animal wastes and local energy for the rural development. The local energy shall be used for integrated agricultural development activities including water pumping, post harvest, agricultural processing, rural electrification etc.

(3) Analysis of data and information and formulation of a detailed concrete development plan for each project selected in this Study

(4) To undertake a preliminary engineering design for the various facilities of the project

(5) To prepare the cost-estimate for the selected project(s)

(6) To carry out the economic and financial analysis of the project(s)

(7) To evaluate the social and environmental impacts of the project(s)

(8) To prepare an optimum implementation program for each of these project(s)

(9) To establish a guideline for the water users association and irrigation department regarding the operation, maintenance of the irrigation system and the effective water management practices.

(10) To propose planning mechanisms for developing a strategic plan for the agro-forestry research system and the priority directions of the agro-forestry science and the respective research programs according to those directions.

(11) To propose cooperation linkages with farmers, farmers associations and research institutes.

6.3 Study Schedule

The study shall be carried into two phases; i.e. Phase I and Phase II. A Tentative Study Schedule is shown in Fig. 2.

6.3.1 Master Plan Study

The master plan study shall be carried out within a period of 8 months, i.e. field work for 5 months in Bangladesh and home office work for 3 months in Japan from thc date of commencement.

6.3.2 Feasibility Study (Phase II Study)

Following the master plan study, the feasibility study shall be carried out within a period of 10 months, i.e. field work for 6 months in Bangladesh and home office work for 4 months in Japan.

6.4 Reports

The following reports will be made by the Study Team and submitted to the Government of Bangladesh.

(1) Inception Report

Twenty (20) copies at the commencement of the study

(2) Progress Report (I)

Twenty (20) copies at the end of the Field Work in Bangladesh

(3) Interim Report

Twenty (20) copies at the end of the Master Plan Study and the commencement of Feasibility Study

(4) Progress Report (II)

Twenty (20) copies at the end of the Phase II Study in Bangladesh

(5) Draft Final Report

Twenty (20) copies at the end of the Home Office Work of the Phase II Study in Japan

(6) Final Report

Fifty (50) copies within 2 months after the receipt of comments from the counterparts on (he Draft Final Report.

7. ESTIMATED PROJECT REQUIREMENTS

7.1 Japanese Contribution

The government of Japan is kindly requested for the technical cooperation through Japan International Cooperation Agency (JICA) including dispatching the Study Team, supplying the equipment and other facilities mentioned below for the Study and performing transfer of knowledge to the counterpart personnel of the Study.

7.7.1 Expertise for the Study

The expatriate experts required for the study will be as follows:

- Team Leader
- Irrigation and Drainage Engineer
- Meteorology and Hydrology Expert
- Soil and Land Use Expert
- Foresty Expert
- Land Conservation Expert
- Agronomist
- Livestock Specialist
- Agricultural Processing/Marketing Expert
- Foresty Processing Expert
- Rural Development Planner
- Design and Cost Estimate Expert
- Project Economy and Cost Estimate Expert
- Surveyor
- Environmental Expert

Total 15 experts

7.1.2 Equipment and Other Requirements

Three personal computers and programs for hydrological calculations
Local transport for the Study Team - 3 Mini vans
Xerox machine for the Study purpose
Water Quality Checker for insitu measurement of the water quality

The above facilities shall be handed over to the Ministry of CHT of Government of the People's Republic of Bangladesh after thc completion of the Study. It is requested that the Study Team shall bring all the necessary equipment, materials and other consumable items required for the Study.

7.1.3 Counterparts Training in Japan

Counterparts training shall be carried in Japan for 1 to 2 month(s) period about the Agro-forestry Techniques & Agricultural Research System in Japan.

7.2 Contribution from the Government of Bangladesh

In order to facilitate smooth implementation of the Study, the Government of the People's Republic of Bangladesh shall take the following measures:

(1) To secure the safely of the Study Team

(2) To permit the members of the Study Team to enter, leave and sojourn in the People's Republic of Bangladesh in connection wilh their assignment therein, and exempt them from alien registration requirements and consular fees.

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

(4) 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.

(5) The following facilities and arrangements shall be provided to the Study Team in cooperation with the relevant organizations;

- Data and information for the Study
- Office room(s) and materials
- I.D. Cards for the members of the Study

(6) To assign full time counterpart personnel to the Study Team during their stay in Bangladesh to play the following roles as the coordinator of the Study.

- To make appointments, and set up meetings with the authorities, departments, and firms wherever the Study Team intend to visit.
- To attend the site survey with the Study Team and make arrangements for the accommodation, getting permissions etc.
- To assist the Study Team for the collection of data and information

(7) To make arrangements to allow the Study Team to bring all the necessary data and information, maps and materials related to the Study.

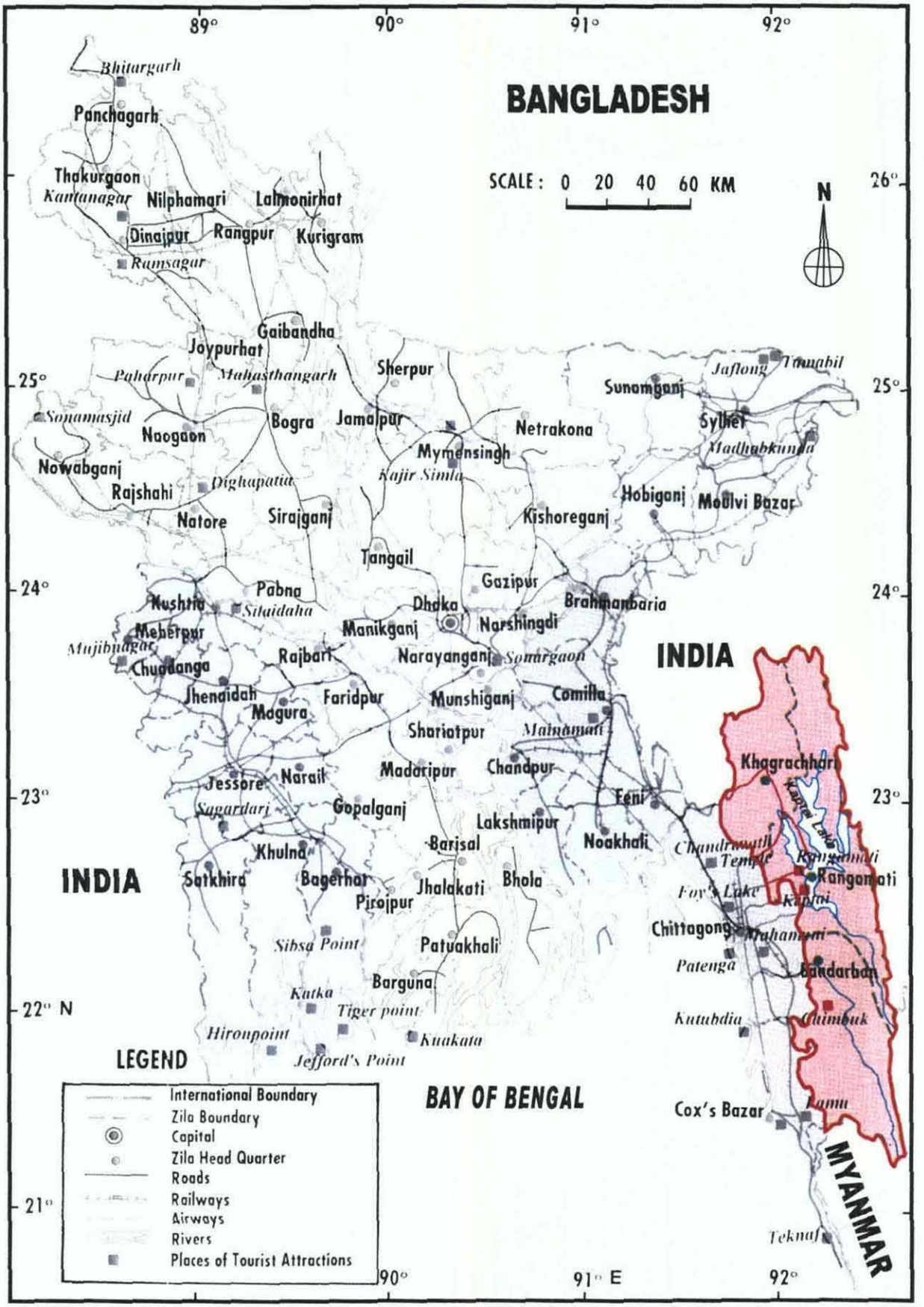


Fig. 1 : Location of the Study Area

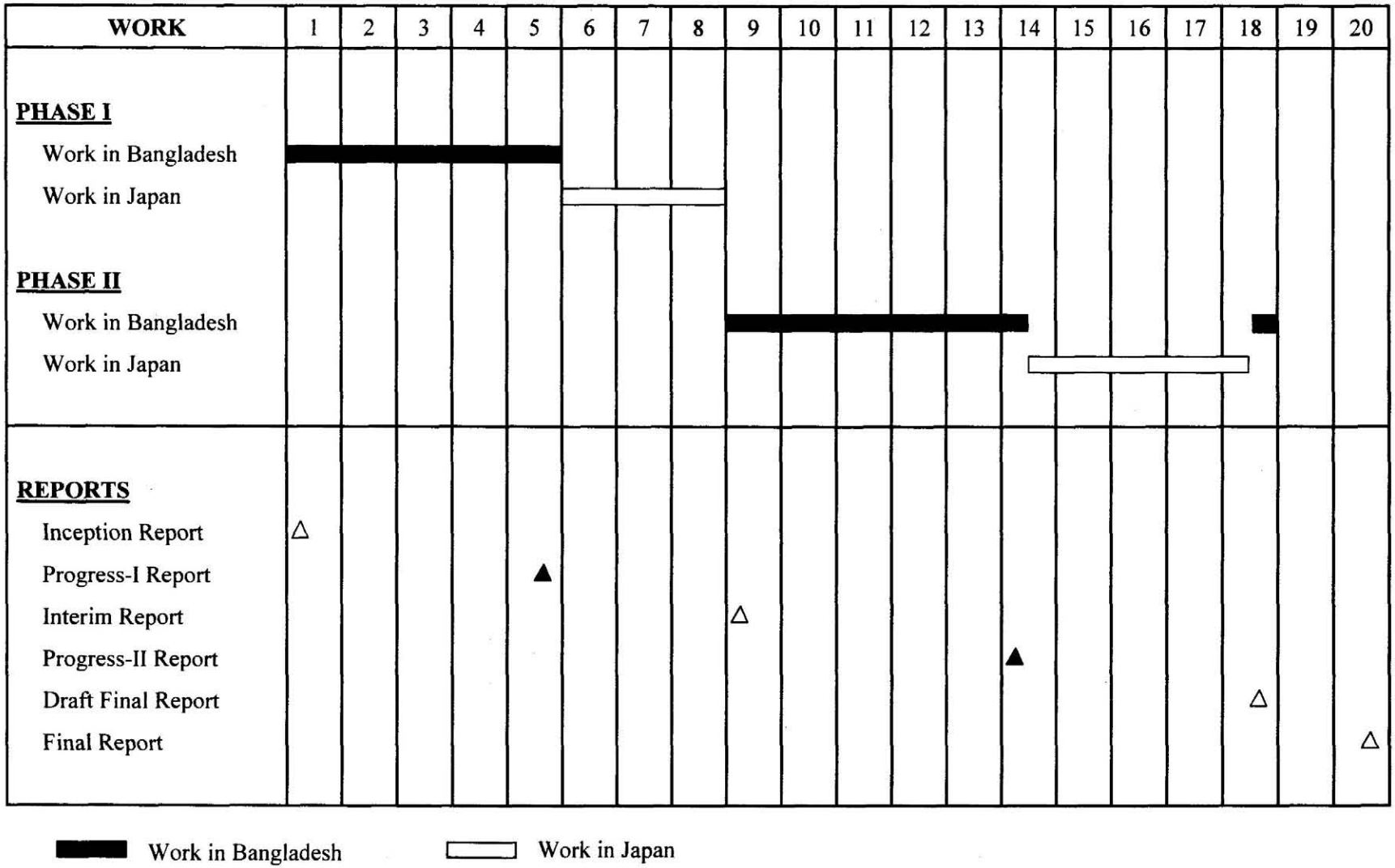


Fig. 2 : Tentative Study Schedule

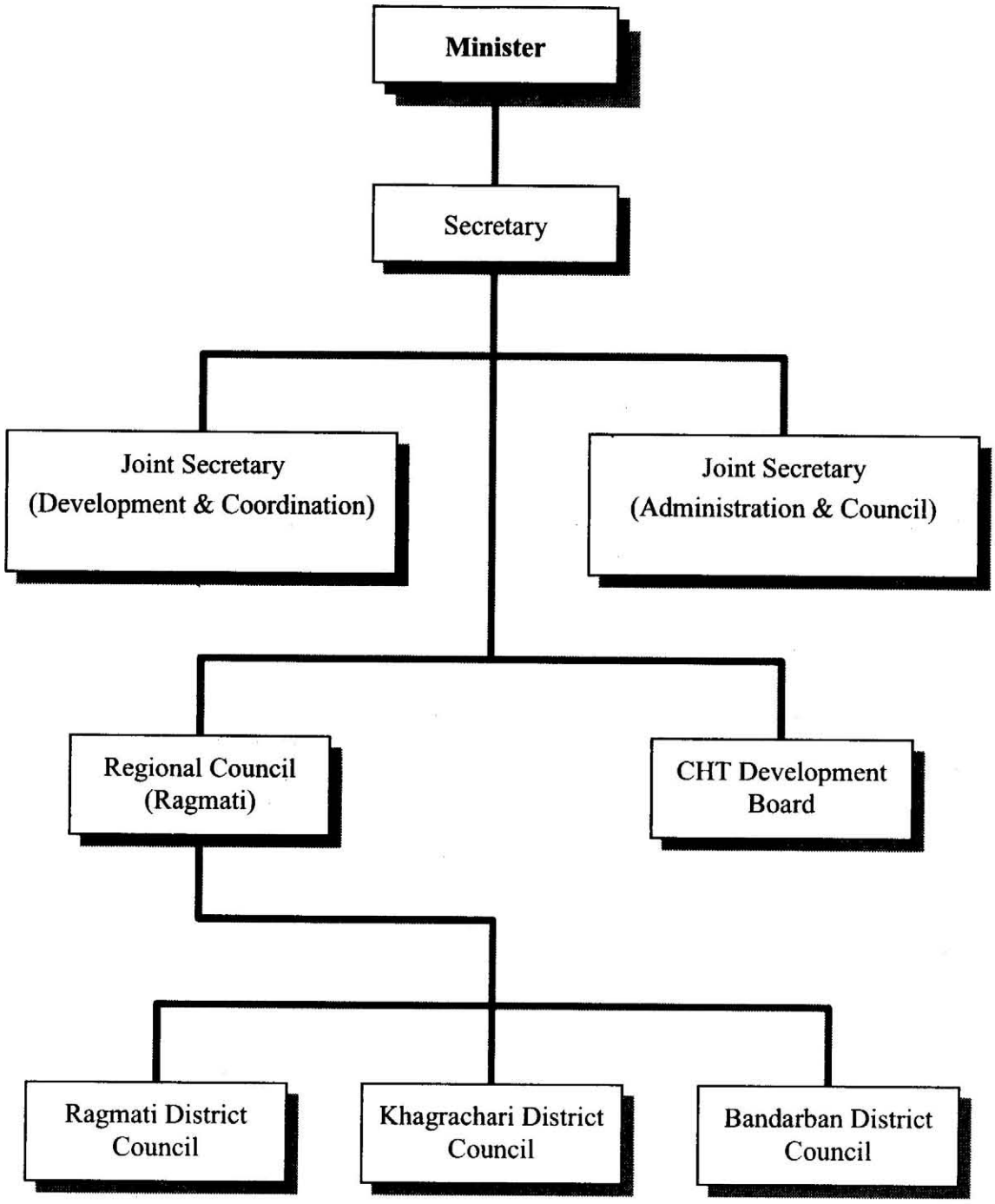


Fig. 3 : Ministry of Chittagong Hill Tract Affairs