No.

アジア・アフリカ知識共創プログラム（AAKCP）
農村コミュニティサブ・プログラム（RCDS）

別冊：Policy Research Project 最終成果品

平成 18 年 8 月
(2006 年)

独立行政法人　国際協力機構（JICA）

株式会社　かいはつマネジメント・コンサルティング

TIC
JR
06-05

目　次

添付資料：最終成果品

1　ケニア

アフリカ実施機関	農業省
アジアパートナー機関	タイ・農業省
最終成果品	食品加工マニュアル

1.1　最終成果品の概要

本成果品は、ケニアの果物や野菜を使った食品加工用マニュアルである。マニュアルの前半は食品加工、包装、そして保存までの流れに沿って基本的技術や留意事項を解説している。後半はマンゴー、バナナ、パパイヤ、トマト、パイナップル、大豆毎に加工方法、包装、そして保存について解説している。

(1)　食品加工の基本技術

・ピクルス

果物や野菜の酢付けについて、その発展の歴史、保存上の利点、製法と原理、適する素材、そして酢付けの種類を解説している。特にピクルスの起源や、食塩を用いて発酵をコントロールする原理について詳しく説明している。

・保存法、キャンディー、グラッセ、甘露煮

砂糖を大量に使って食材を保存する 3 種類の調理法を紹介している。1 つは最初から食材を砂糖と一緒に煮る手法であり、2 つめとして砂糖は食材が柔らかくなった後で加え、一定期間放置する手法である。3 つめは、食材を煮た後にシロップ漬けする方法である。また、キャンディー、グラッセ、甘露煮についての調理方法を解説した後に、こうした製品に適した包装・保存方法も併せて紹介している。

・飲料

ジュース及び類似した多様な食品を分類し、簡単に解説している。例えば、100%ジュースは濃縮も添加もしていない、ジュースは 10～20%の果汁が含まれていること、ネクターは砂糖・水・酸そして果汁を 25～50%含む、などである。

・ドライフルーツ

ドライフルーツの製法にはいくつかあることを紹介した上で、天日干しの手法について説明している。また、ドライフルーツに適した包装・保存方法について紹介している。

(2)　食材・食品毎の食品加工、包装、保存技術

個々の食材・食品毎に加工方法、包装、保存技術について紹介している。対象となった食材と食品は下表のとおり。

表 1.1　ケニア食品加工マニュアルにおける食材、食品、解説内容

食材	食品	解説内容
マンゴー	マンゴーソース、ジュース、ドライペースト、ジャム、ゼリー、チャツネ	加工方法、必要な機材、製品のアピールポイント、包装と保存方法
バナナ	バナナチップス、バナナの糖衣がけ、ペースト、バナナ&パパイヤジャム、バターチップス	
パパイヤ	ジャム、ソース、ドライペースト、ドライパパイヤ、グラッセ、フルーツサラダ	
トマト	濃縮ジュース、ジュース、グラッセ、ソース	
パイナップル	ジュース、パイナップルスカッシュ、ジャム、ゼリー、ペースト	
大豆	豆乳、クラッカー、クッキー、プリン、ドレッシング、パンケーキ	

1.2　コメント

1.2.1　課題

(1)　知識共創

本マニュアルの作成においては、知識共創の側面が乏しいことが明らかである。PRP の計画ではタイから学んだ知識・技術を基にマニュアルを作成し、ターゲット地域でマニュアルを基にした活動を行った上で普及員や地域住民からのフィードバックを反映して、ケニアに適合した内容にする予定であった。しかし、PRP 期間の制約のため、現地適応試験は実施されておらず、本マニュアルは、タイから得た知識そのままの内容を盛り込んだものに留まっている。今後、本マニュアルを現地で活用していく中で、消費者の嗜好や素材の特性に合わせて材料の分量を変更することは必要である。さらに分量の単位も g や mL ではなく、スプーン 1 杯や 1 カップなどと村落地域で普通に使われている用具による計量システムに改めたり、調理の温度も 85 度で 3 分と記載するより、一煮立ちさせてから弱火にして 3 分、などと温度計などの特殊な機材を必要としない解説へと改訂することが必要と考える。

(2)　内容

ケニア PRP の上位目標はターゲット地域の住民が、本マニュアルを活用することによって農産加工品を制作・販売し収入を向上させることである。その点を鑑みると、マニュアルがカバーしている内容が、製造・包装・貯蔵に留まっており、どのように販売するか、といったマーケティングに関する解説がないことはマニュアルとして不十分と考えられる。例えば、製造者の住居を大量消費地からの距離・アクセスの容易さによっていくつかに分類し、それぞれに対して、消費者のターゲッティング（男性・女性、年齢層、既婚・未婚など）、商品の PR 方法（試食会、広告、口コミなど）、商品の輸送方法、販売方法（直売、委託販売など）について説明を付け加えることが望ましい。こうした情報は加工品の販売を促進し、収入向上にも結びつく。

また、AAKCP RCDS の目的の一つはコミュニティ開発であるため、ケニアにおいては住民グループを組織して農産加工品を行い、コミュニティ全体の開発に貢献するべきと考える。従って、加工品作成グループの組織化、資金の集め方、組織運営方法、といった農産品加工を組織で行う場合のマネジメントについても、本マニュアルに記載されるべき事項と考える。

1.2.2 評価すべき点

本マニュアルにおける「レシピ」の部分、つまり具体的にどのようにして食材を調理するか、という点は作業のステップ毎に極めて分かり易く書かれている。また写真も挿入されているため、完成品をイメージしつつ加工できる。こうした点は実際の加工作業を容易に、かつ失敗を少なくする上で効果的である。

加えて、マンゴー、バナナを始めとした合計 6 種の果物・野菜について、ジュース、ドライ製品、ジャムなど多岐にわたる製品の作り方を紹介している。こうした豊富な選択肢の提供は、加工者、消費者共に幅広い対象者に対して関心を喚起し、農産加工ビジネスとそのマーケットを拡大する上で有益である。

2 セネガル

アフリカ実施機関	農業省
アジアパートナー機関	タイ・ホワイ・ホン・クライ王室開発研究センター
最終成果品	水管理開発計画書

2.1 最終成果品の概要

(1) 提案プロジェクトの背景

セネガル国の水資源管理における戦略は、社会経済を主体とする開発政策に沿ったものでなければならない。1992 年にリオサミットが開催されて以来、セネガルは水資源の総合的な管理を推進してきた。農業省水資源管理局（DGPRE）では具体的な水資源管理計画を策定し、参加型手法を用いて地方での活動を展開している。

一方 AAKCP RCDS の活動が開始され、セネガルのパートナーとしてタイ国のホワイ・ホン・クライ王室開発研究センターが選定された。このセンターには農業生産における水資源開発の分野で共創し得る多くの経験が蓄積されており、農民の収益向上に資する成功事例も数多く存在する。PRP 実施後は、まずタイからセネガルに向けた SV が実施された。その後セネガル側からタイへの SV を実施し、対象地域であるサンガルカンでの持続可能で総合的な農業開発を進める上で必要となる知識・経験をタイ側パートナーから学んだ。特に同センターの目的は、単に地域住民の収益向上のみでなく、地域全体が貴重な自然資源を保全しながら持続的に経済発展を達成することにあり、セネガルにとっては学ぶべき点が多い。同センター周辺の農村コミュニティでは、農業を地域全体で推進するための組織化が進んでお

り、水管理、水資源の保全等の分野において、住民間でルールを定め、組織的に対応している。このような組織的な管理方法により、タイは農民の収益向上と食糧自給の二つの目的を達成したと言える。

住民レベルでの水保全としては、竹や石材を利用したチェックダムと呼ばれる小規模ダムの施工により、対象地域全体に水が供給されるような対策が講じられている。このダムの建設はタイ王室の主導により、チェンマイを中心とする北部の山岳地帯の洪水被害を防止することから始められた。ダムの建設により治水の目的が達成され、また灌漑の発展も促した。

(2) 目標

・ 水資源の回復・発展（（4-1）活動内容の 1、2 番目の項目に対応）
・ 持続的農業開発のための住民のキャパシティ開発（（4-1）活動内容の 3 から 6 番目の項目に対応）

(3) 成果

・ 地域の水資源について知り、適切に活用される
・ 地域開発の実務者が、既存の資料やノウハウについての知識を向上させる
・ 農業普及員が地域資源の保全を目的として、灌漑設備に関する知識を向上させる
・ 農民組合が活性化される
・ 小作農の技術が向上する
・ 食糧自給を目的とした農業開発が実施される

(4-1) 活動内容（短期：3 年）

・ 土地の活用形態別地図と、資源活用計画の作成
・ ため池造成計画の作成
・ 農業普及員を対象としたキャパシティ向上
・ 既存のセンターの強化
・ 住民組織とネットワークの構築
・ 知識、ノウハウの集積
・ 日本、タイとの協力関係の強化

(4-2) 活動内容（中長期：10 年）

・ 地域の水路調査
・ チェックダムの作成による土壌水分の回復
・ 自然資源の回復

(5) 投入

・ セネガル側：住民代表 7 名、政府機関職員 10 名
・ タイ側：フアイ・ホン・クライ王室開発研究センター

・ JICA 側：短期計画のためのプロジェクト予算

2.2 コメント

2.2.1 課題

(1) 知識共創

セネガルの実施機関では、本開発計画において PRP をプロジェクトの第 1 フェーズ、PRP 終了後は第 2 フェーズとしてそれぞれ位置付けている。従って、本計画書で提案している第 2 フェーズは第 1 フェーズである PRP の成果が充分に反映されていなければならないが、その点が不十分である。

まず SV をとおしてタイから学んだ内容が記載されていない。従って、タイからの学びの点のどの部分が開発計画に反映されているかが不明である。またタイの知識がセネガルの課題解決に有効であることを、PRP の実施をとおして確認できたと推察されるが、その有効性も記載されていない。例えば、タイから学んだ竹や石材を利用した小規模ダムを作成し、土壌の保湿性を回復させる手法について、プロジェクトサイトにおける実証がなされたり、その結果が記載されているわけではない。活動においては、その学びの点をセネガルのプロジェクト対象地域にいかに適応させていくかという重要な点が記載されていない。上記の点を開発計画書にきちんと記すことによって、PRP を踏まえて作成された計画としての妥当性を示すことが出来る。

(2) 内容

・プロジェクト目標の選択

PRP の目標は水資源の管理技術の改善、水利組合における対話の活性化であったが、本計画では水資源の回復・発展、及び持続的農業開発を目的とした住民のキャパシティ開発へとプロジェクト目標が拡大している。具体的には水資源の回復・発展に対応する活動として、土地の活用形態別地図と資源活用計画の作成、ため池造成計画の作成があげられ、持続的農業開発を目的とした住民のキャパシティ開発としては農業普及員を対象としたキャパシティ向上、既存のセンターの強化、住民組織とネットワークの構築、知識とノウハウの集積が計画されている。これはタイから学んだ内容に影響を受けているものと思われるが、限られた期間と投入で拡大したプロジェクト目標を達成できるかどうか、充分に考慮されるべきと考える。場合によっては、水資源に係わる内容と、農業開発のためのキャパシティ開発は、別々のプロジェクトとして実施することも検討すべきである。

・計画の論的整合性

問題、プロジェクト目標、成果、活動に一貫した論理的つながりが欠如している。問題点とその要因分析の関係において、問題点である水資源不足の要因は農民が正しい知識を基に水を使用していないことと示されている。しかし、プロジェクト目標の段階で、この課題に対応して、土地の活用形態別地図と資源活用計画の作成、ため池造成計画の作成等の水資源の回復と開発、農業普及員を対象としたキャパシティ開発、既存センターの強化、住民組織とネットワークの構築、知識の集積等の農業開発へとその対象が拡散してしまっている。またプロジェクト目標－成果－活動の関係もきちんと整理されていな

い。例えば、プロジェクト目標の一部分である「水資源開発」につながる成果があげられていない一方、それに対応する活動として、「土地利用調査」と「ため池造成計画」が計画されている。

加えて、活動のレベルにおいては、成果を達成するためにどのようなステップを踏んで活動を進めていくか具体的に計画されていない。例えば、「ため池造成計画」においては、ため池造成を計画している場所が記載されているに留まっている。また、評価の際に計画の達成度を示す指標についても、量的に示されてはいない。

このように、本開発計画は十分説得力のある内容とはなっていない。セネガルのターゲット地域にある固有の課題「水資源の有効活用」を果たす上で、タイから学んだ普及員と住民のキャパシティ開発、組織化、地域センターの活性化を組み合わせようという試みは理解できる。しかし、こうしたタイからの学びの点を安易にプロジェクト活動に組み込むのみで、セネガルの課題解決のための手法として十分に適用されていない。これは、知識共創が十分に行われなかったことを示している。

2.2.2 評価すべき点

セネガルへの適用は十分ではないものの、タイから学んだ内容を積極的に取り入れてプロジェクトを計画したことは、タイの知識に対する強い関心を示している。セネガルの実施機関は、タイがいかにして農村開発の分野で成功を修め、かつ食糧自給を達成したかについて着目しており、SV の報告書にもその旨記載されている。今後はタイの知識、技術、経験が如何にセネガルの課題解決にとって有効かを分析し、その上で、課題解決の手法を現地に適応する形で計画するべきと考える。

3 南アフリカ

アフリカ実施機関	リンポポ州農業局
アジアパートナー機関	タイ・ホワイ・ホン・クライ王室開発研究センター
最終成果品	土壌浸食対策及び土壌水分の回復のための技術研修提案書

3.1 成果品の概要

(1) 提案プロジェクトの背景

導入部分で本研修を企画する背景として PRP の実施をあげており、その活動と成果の概要を記している。主な PRP の成果は以下のとおり。

- PRP は効果的な土壌および水管理について住民の意識を向上させた
- ランドケア委員会*1) は利用可能な資源を使った土壌および水管理の手法について学んだ
- 将来的にはハーブなどの有用な草木を植樹することを学んだ
- 委員会のメンバーは団体精神と自立心を培った
- チェックダム*2) は土壌浸食防止と土壌水分の回復に効果的であることが、実証試験により証明された。
- タイ専門家による指導の後、同委員会はチェックダムの建設を継続した。

*1) 農業振興のために土壌の向上を推進するという国家プロジェクト「ランドケアプログラム」に組み込まれた住民組織
*2) 小川に建設する手作りの小規模ダム

(2) 課題

ターゲット地域であるスククネ郡では激しい土壌浸食が同州の基幹産業である農業開発に悪影響を与え、失業と貧困の一因となっている。土壌浸食の原因は複数あるが、一つは不適切な土壌および水管理の手法である。

(2) 目標

・ ターゲット地域の農業普及員と住民の代表が、チェックダム建設の研修を受講する
・ ターゲットグループのメンバーがチェックダム建設の研修を受講する
・ タイ側との知識共創をとおしてチェックダムの有効性を向上させる

上位目標

・ スククネ郡の自然環境の回復

(3) 成果

・ ターゲット地域の農業普及員と住民の代表が、チェックダム建設の研修を受講し、学んだ技術を他者に教えることが出来るようになる
・ チェックダムによる土壌浸食対策がスククネ郡の 30%の地域で実施される
・ 本プロジェクトの成果を、南アフリカおよびタイ側が合同で評価する

,,,

(4) 活動内容

・ キーとなる農業普及員、住民代表に対するチェックダム建設研修の実施
・ チェックダム建設による土壌浸食対策の普及
・ タイ側との合同評価

(5) 投入

・ 南アフリカ側：プロジェクトマネージャー、農業普及員、農業局以外の省庁、住民組織、NGOs、農業局の事業予算

3.2 コメント

3.2.1 課題

(1) 知識共創

本 PRP の最終成果品は技術研修の実施提案書である。その研修では、チェックダムというミニダムを建設することによって、土壌の浸食を防ぎ、土質水分の回復を促すというタイの知識・技術を本格的にリンポポ州のスククネ郡に導入・適応をはかり、普及することが目的である。そのためにはまず、PRP

で行われたパイロットプロジェクトの結果、すなわち知識共創の結果をきちんと示し、それが有効であることを明らかにする必要がある。ところが、本提案書の導入部分で、チェックダムの有効性が確認された、とあるが、具体的にどのように有効であったか、また、チェックダムの建設においてどのような知識共創が行われたかが記されていない。

また、導入部分でチェックダム以外にも南アフリカ側が PRP において学んだ点が記されている。例えば、1) 有用な樹木を植えることで将来活用可能な自然資源を増やすことができること、2) コミュニティによる団結力と自立心の重要性、などは本 PRP の上位目標である「自然資源の有効活用」にもつながるため、重要な学びといえる。しかし、本提案書における研修計画の内容には、上記 2 項目は含まれていない。つまり、学んだ知識を地域でどう活用して開発に結びつけていくか、という知識の適応が十分に出来ていないことを示している。

(2) 内容

上記(1)知識共創において上述のとおり、チェックダム手法を PRP のパイロットプロジェクトにおいて実施しているが、その結果が具体的に記されていない。従って、この手法の妥当性が記されていないことがまず問題である。同様に上記(1)では、チェックダム以外の学びの点が、研修計画に盛り込まれていないことを記したが、結果として研修の効果に影響を与えることが予想される。本研修事業の上位目標は「スククネ郡の自然環境の回復」であるが、この達成のためには上記 1) 自然資源の活用、は深く関わっているし、自然環境の回復という長期的な事業には、同 2) 住民の団結力と自立心の重要性などについて、地域の住民や普及員が十分認識することが必要である。従って、本研修内容はタイからの全ての学びを振り返りつつ見直すべきと考える。

また、本研修計画が解決を図る問題は土壌浸食であるが、その原因は様々である。具体的には過放牧、燃料用森林伐採、不適切な耕作、不適切な土地と水管理が本研修計画書において提示されている。本研修計画は、不適切な土地と水管理、を解決するための対策とされているが、他の要因は本研修では対処しないため、これらは本プロジェクトの外部要因となり、研修の目的である土壌浸食の解決に影響を及ぼすことも懸念される。他の要因の動向については十分研修提案書において分析を提示し、キラーアサンプションとならないことを確認しておく必要がある。

3.2.2 評価すべき点

(1) 具体的な活動計画

タイ専門家によるトレーニングへの参加者とその数、そしてその参加者がどのようにトレーニング内容を周辺地域に普及していくかが、具体的に計画されている。これは、ターゲット地域の農業局で住民をまきこんだ活動を実施する際に取られる一般的なステップであるため、普及活動による知識の拡散はスムースに実施されることが予想される。また、本研修提案書を作成した職員が、こうした普及活動に精通していることが予想され、プロジェクトの確実な実施が期待できる。

(2) 自立発展性

PRP 終了後、チェックダム手法の普及は上述のランドケアプログラムにおいて推進されることとなっており、本研修事業の終了後も同プログラムが、ランドケア委員会と共にチェックダム手法の普及を推進していくこととなっている。このように国家事業にしっかりと組み込まれているため、本研修事業の高い自立発展性が期待できる。

4 タンザニア

アフリカ実施機関	コミュニティ開発・ジェンダー・子供省
アジアパートナー機関	タイ・保健省
最終成果品	郡レベル担当者のための HIV/AIDS 予防計画立案ガイドライン

4.1 最終成果品の概要

(1) 背景と目的

本ガイドラインは、郡（district）レベルでのマルチセクターにおける HIV/AIDS 対策担当者が、その予防計画を立案する際の手順を以下(2)(i)から(2)(iii)の 3 ステップに分けて説明している。なお、本ガイドラインでは、以下の 3 つの HIV/AIDS の予防対策に焦点を当てている。

- 年齢・性別毎の健康促進対策
- コンドームの普及
- STI（性感染症）対策

また、本ガイドラインは以下の資料を踏まえて作成された

- HIV/AIDS 予防のための国家戦略枠組(2003-2007)
- HIV/AIDS に関する国家政策
- ンボメロおよびモロゴロ郡における HIV/AIDS に関するベースライン調査（2006）

(2) 郡レベルにおける HIV/AIDS 予防計画立案手法

(i) HIV/AIDS 予防のための国家戦略枠組(2003-2007)の分析

タンザニアには、HIV/AIDS 予防のための国家戦略枠組(2003-2007)が制定されており、郡レベルの計画も上記戦略に沿って作成されなければならない。ここでは、HIV/AIDS に関する知識の普及率といった HIV/AIDS の予防に関する点に絞って、本戦略書に記載されている国レベルの目標を踏まえつつ、当該郡の目標を設定する手法を解説している。また、1) アドボカシー、2) 非難中傷との戦い、3) コミュニティの対応、4) STI 対策、5) コンドームの普及、6) 年齢・性別毎の健康促進対策、については、その必要性、達成されるべき成果、郡レベルでの対応を例として提示している。

(ii) 地域における HIV/AIDS の現状把握とその評価

郡レベルの計画作成のためには、地域の HIV/AIDS についての現状を把握する必要がある。(1)で記した、HIV/AIDS 予防の 3 項目、また(2)(i)で示した 1)から 6)までの重点項目について、地域の現状を知る

ために必要な指標とその入手方法を説明している。また、得られたデータを基に、地域の課題を解決するための目的系図を作成することを解説している。

(iii) 調査結果に基づいた郡レベルの HIV/AIDS 予防計画の立案

ンベト及びモロゴロ郡を対象に、PRP において実施したベースライン調査の結果を分析し、そこから(1)で示した重点 3 項目について予防計画を立案した例を示している。

4.2 コメント

4.2.1 課題

(1) 知識共創

本ガイドライン作成における知識共創のプロセスは必ずしも明示されていないが、ガイドラインの内容、参考資料、本 PRP においてタンザニア側が学んだ内容を踏まえると、知識共創がしっかりと行われたことが推察される。まず、本ガイドラインは 4.1(1)で記したとおり、HIV/AIDS に関するタンザニアの既存知識といえる国家政策や戦略に沿って作られており、HIV/AIDS 予防のための重要 3 項目も参考資料の一つである HIV/AIDS 予防のための国家戦略枠組(2003-2007)から選択されている。ただし、この 3 つの項目選択において、タンザニア側がタイ側から学んだ点が反映されている。具体的な学びの点としては、HIV/AIDS 予防においてコンドーム使用の徹底と住民の自発的カウンセリングが有効であること、STI と HIV/AIDS 対策は組み合わせて実施することで相乗効果を得られること、HIV/AIDS 患者自立のための収入創出プロジェクトが効果的であること、HIV/AIDS 治療には抗ウイルス治療が有効であることなどがある。この点は、既存の知識と外部からの知識を融合させて、新たな知識が創造されたことを示している。

また、ガイドラインにおける HIV/AIDS 予防計画作成の 2 と 3 番目のステップでは、PRP で実施されたベースライン調査の計画作成、実施、結果分析、結果から予防計画作成までを実例として解説している。このベースライン調査の計画・実施・結果分析は、電子メイルに加えタンザニアでの SV や最終セミナーの機会を活用し、タンザニアとタイ側による綿密なやりとりをとおして実施された。ここにはタンザニアとタイ側による知識共創の成果が蓄積されている。本調査のノウハウが、HIV/AIDS 予防計画作成における 2 と 3 番目のステップの主たる要素であることから、この点においても本ガイドラインは、知識共創を十分に活用して作成されたといえよう。

(2) 内容

・具体的計画作成の必要性

本ガイドラインの第 3 ステップでは、調査結果を基に HIV/AIDS 予防計画を作成することとなっている。しかし、提示されている例によると、防止ための方針を提示することに留まり、具体的な防止対策活動の作成にまでは至っていない。例えば、配偶者以外のパートナーが HIV/AIDS 感染の原因であることに対して、幸福な家庭を築くことが対策としてあげられている。しかし、その具体的アクションは提示されておらず、別途作成する必要がある。

・その他

本ガイドラインにおける HIV/AIDS 予防計画作成の 3 ステップは、目標設定、現状調査の手法、調査結果をもとにした計画作成、に分かれているが、1 と 2・3 ステップの関連性が見えずらく、ステップ 1 の成果をそのようにしてステップ 2･3 で活用するか不明である。また、ステップ 2 では地域の HIV/AIDS についての現状調査について説明しているが、アンケートの構成や、質問項目例などタンザニア実施機関が培ったより具体的なノウハウを示すとより役立つと考える。加えて、ステップ 2 では目的系図の作成を説明しているが、目的系図は問題系図を基に作成されるので、問題系図も併せて説明する必要がある。

4.2.2 評価すべき点

タンザニアの実施機関は、保健省ではなくコミュニティ開発・ジェンダー・子供省であり、PRP 担当者の中にも HIV/AIDS に関する専門家は含まれていない。こうした担当者が専門知識を蓄積しつつ、コミュニティ開発の側面に着目して、ターゲット地域における HIV/AIDS 予防計画を作成した。このノウハウは、HIV/AIDS の専門知識を持たない地域のコミュニティ開発担当者にとって、コミュニティ開発という側面から HIV/AIDS 対策を検討する上で極めて有益といえる。

5 ウガンダ

アフリカ実施機関	農水畜産省
アジアパートナー機関	タイ・農業省農業普及局
最終成果品	灌漑地における農民収入向上にかかるプロジェクト提案書（案）

5.1 成果品の概要

(1) 提案プロジェクトの背景

ウガンダにおける最大の課題は貧困であり、国民経済において大きな割合をしめる農業分野からの収入を向上させることが必要である。本プロジェクトのターゲット地域である Doho Rice Irrigation Scheme による灌漑地域では普及員と農民の収入向上に係る能力が未だに低レベルの状況にあり、特に灌漑、土・水管理、収入向上のための零細企業、農民組織化が課題となっている。本プロジェクトは、PRP で得られた成果を拡大・発展させることに着目して計画されている。具体的には PRP における水利組合の形成と農民組織の強化・拡大について、110 名の参加者から成る水利組合が組織されたこと、ターゲット地域の農民組合の登録者が 5 から 10%に増加した等の一定の成果が見られた。これを受けて本プロジェクトでは、水利組合と農民組織の更なる形成・拡大・強化を成果の一つと掲げている。また、PRP で稲作と水田養魚の複合農業が試行されている。本プロジェクトではその試みを本格的に発展させ、稚魚の育成、養殖池の造成、養殖農家の拡大を実施する計画となっている。

(2) 目標

ターゲット地域の住民の収入が向上し、十分な食料と栄養を摂取できるようになる。

(3) 成果

・ 農業普及員 15 名の技術力を向上させる
・ 農民 400 世帯の収入獲得技術を向上させる。分野は、稲作、米穀加工品、水田養魚、野菜栽培、マッシュルーム栽培、マーケティング。
・ 稲作と水田養魚の複合農業の導入
・ 農民組織の活性化と運営能力の向上。強力な農民組織×1、女性グループ×10、水利組合×10 の設立。
・ 農業技術移転センターの設立

"

(4) 活動内容

・ 稲作と水田養魚の複合農業の訓練の実施
・ 稚魚繁殖施設の設営
・ 普及員に対するタイ側における技術協力の実施
・ 対象地域の農民組織化、および強化のための研修の実施
・ 農業技術移転センターの設立

(5) 投入

・ ウガンダ側：カウンターパート 5 名、研修施設、JICA 専門家用事務室
・ タイ側：稲作と水田養魚の複合農業専門家、マッシュルーム栽培専門家
・ JICA 側：プロジェクト予算 20 万ドル、水管理および稲作専門家（1 名）

5.2 コメント

5.2.1 課題

(1) 知識共創

本提案書は、PRP で得られた成果、具体的にはタイから得た知識・技術を活用して作成したターゲット地域の課題解決のための計画という位置付けであるべきである。その点において、5.1(1) 背景で示されている PRP での活動と成果、そしてそれらと本提案書との関連の説明は不十分である。成果や活動において、稲作と水田養魚の複合農業に取り組むことが示されているが、これは PRP において開始されたパイロット事業を発展させることを示している。しかし、パイロット事業の成果が明らかになっておらず、このまま継続・拡大させる根拠がない。6 ヶ月という PRP 実施期間の制約はあるが、この新規事業についてこれまでの進捗、課題、今後の発展の可能性なりとも記載し、事業継続の妥当性を担保する必要がある。

また、本プロジェクトの活動・成果には農業技術移転センターの設立が含まれているが、本センターの機能、本プロジェクトにおける役割、設立の必要性などが記載されておらず、センター設立の妥当性

が十分示されていない。PRP で得たアイデアならば、タイにおける同様のセンターの有効性や役割を記し、ウガンダの課題解決にどのように役立つかを具体的に説明する必要がある。

(2) 内容

・マッシュルーム栽培

マッシュルーム栽培について、ウガンダにおける市場性、パッキング、保存設備、輸送等の面を十分検討する必要がある。トライアル的に試験場で養殖を実施し、小規模で流通・販売してみるのが適当と考えられる。その結果を踏まえ、ウガンダの実情に則した形で徐々に栽培規模を拡大していくべきと考えられる。

・稲作

PRP には含まれていた灌漑を有効活用したイネの増収策について、本提案書では十分にはふれられていない。提案書に示されている通り、対象地域の主作物はイネであり、地域の農家が稲作を主体としながら、複合経営の中に水田養魚を取り入れていくべきと考える。また、PRP の活動をとおして対象農民に奨励している稲作技術の普及が進み、PRP が農民の稲作技術向上に寄与したことが示されている。具体的には、種子の選別、苗床作成、適切な時期の田植、栽植密度などがあげられる。従って、本プロジェクトにおいても稲作技術の向上は継続して取り上げられるべきと考える。

・プロジェクト計画

提案書の中に、提案書の焦点、具体的成果、期待される成果、活動の成果と複数の「プロジェクトの成果」に相当する記述が含まれている。また、活動、プロジェクト実施の暫定計画、活動計画と「プロジェクトの活動」に相当する複数の内容が提案書に混在している。このままでは、提案書の内容を正しく理解する上で大きな障害となっている。従って、プロジェクトの目標、成果、活動は統一し、互いの関係における論理的整合も見直すべきである。

5.2.2 評価すべき点

(1) 農民組織化の推進

5.1(1)で記したように、PRP において水利組合の形成と農民組織の強化・拡大において一定の成果が見られた。それを受けて本プロジェクトでは、水利組合と農民組織の更なる形成・拡大・強化を成果の一つと掲げている。この点は、本プロジェクトは PRP で得られた成果を拡大・発展させる、という関連性と妥当性を明確に示しており高く評価できる。

(2) 明確なゴール

本提案書には、具体的な成果として、量的指標を含んだ達成目標を記している。こうした数値化した目標は、モニタリング・評価の際に便利なだけでなく、プロジェクト活動を予定どおり運営し、プロジェクト目標を達成させるためにも不可欠である。

6　ジンバブエ

アフリカ実施機関	農業省
アジアパートナー機関	タイ・カセサート大学
最終成果品	普及員向け実務マニュアル

6.1　最終成果品の概要

(1)　作物栽培耕種基準

作物の一般的な耕種基準について作物別に示している。適応する土壌条件、気象条件を示した上で、現在流通している品種および奨励品種を紹介している。耕作、施肥、追肥、土壌改良、播種、育苗、定植、除草、作物管理、病虫害防除、収穫、保存など一連の技術的な基準を普及員向けに平易に解説している。

Ⅰ．食用作物

①トウモロコシ、②コムギ

Ⅱ．雑穀栽培

①ソルガム、トウジンビエ、シコクビエ

Ⅲ．換金作物

①メンカ

Ⅳ．油糧種子

①ラッカセイ、②ダイズ、③ヤトロファ、④ヒマワリ

Ⅴ．園芸作物

①トマト、②バターナッツ、③キュウリ、④バレイショ、⑤カンショ、⑥タマネギ、⑦ケール、⑧ナノハナ、⑨フダンソウ

(2)　家畜飼養基準

畜産については､特に牛の肥育について詳細に解説している｡流通している品種とその特性を紹介し、人工授精、妊娠の診断方法、人口分娩、家畜栄養と飼育技術、飼料の管理などの技術を時系的に紹介している。また、養豚、養鶏等の他の家畜の飼育技術や、淡水魚の養殖、養蜂にも言及している。

①肉牛飼育と管理、②酪農、③子牛の肥育、④子牛の去勢、⑤子牛の除角、⑥養豚、⑦養鶏、⑧羊の飼育技術、⑨ヤギの飼育技術、⑩ウサギの飼育、⑪淡水魚の養殖、⑫養蜂

(3)　農業機械と農業経済

農業機械については、鍬、鋤などの農具については牛耕、トラクター、人力別に簡略に説明している。また、土壌保全の方法について、耕作方法による工夫や人的造作物を作成する手法が述べられている。農業金融のしくみ、土地、労力、資本等の農業生産構成要素、農産物のマーケティングについては簡略な解説がなされている。灌漑については水源、用水路などの設備が羅列されているにとどまる。

Ⅰ．農業機械、Ⅱ．土壌と水の保全、Ⅲ．農業金融と販売、Ⅳ．灌漑設備の開発

6.2　コメント

6.2.1　課題

(1)　知識共創

ジンバブエからの最終報告書によると、マニュアルの内容はジンバブエ既存のマニュアルをベースにし、使いやすさや見やすさをについてタイからの知識を活かして作成したこととなっている。従って、本マニュアル作成において知識共創が果たした役割は限定的と考えられる。また、同最終報告書によると、遅れ気味に進捗した PRP 期間中には本マニュアルの試行までは完了せず、現地適用は今後の課題となっている。

(2)　内容

・構成

普及員は本マニュアルを使って、農民に対する指導を行うこととなっているので、まず農業普及方法についての総論があるべきである。その中には、本マニュアルを活用した普及指導手法について説明があると、普及員も活用しやすい。

・その他

- 養分欠乏症、病害症状は文章での説明では分かり難いため、写真を挿入すべき。またこれら以外についても図解出来るものは、極力図を挿入すべき。
- 播種、施肥、薬散、収穫時期を分かり易くするため、耕種暦を棒チャートで表示すると良い。
- 農薬、除草剤名は可能な限り記載すべき。特定業者の宣伝が問題になる場合は、入手可能な同種の薬剤を全て記載することが望ましい。
- 施肥量は対象地において肥料試験を行った結果なのかが不明である。試験結果を反映していない場合は、一般的な奨励施肥量と明記すべき。
- 資機材を投入した際の収益増加量、経営分析について説明があった方がよい。

6.2.2　評価すべき点

全体として本マニュアルは作物および家畜別に体裁が整っており、日本で一般に使われている耕種基準、飼育基準の内容とも相応していて、普及員用のテキストとしては読み易いものと評価出来る。より具体的な評価すべき項目は以下のとおり。

(1) ジンバブエの気象、土壌条件が考慮されている。
(2) 作物別、家畜別、さらにその中で個々の技術が時系的に解説されており、耕種、肥育基準として読み易く整えられている。
(3) 多くの作物、家畜についての耕種、肥育基準が記載されており、対象地域の農民による新しい作物、家畜の導入を促進する上でも役立つと期待できる。

以　上

添付資料

PRP 最終成果品

ケニア

PROCESSING OF FRUITS/ VEGETABLES AND SOYA BEAN

An extension manual

Developed by the Ministry of Agriculture -Kenya in Conjunction with Department of Agricultural Extension, Ministry of Agriculture and Cooperatives-Thailand

Funded by JICA
Through AAKCP-RCDS

May, 2006

Processing of fruits, Vegetables and Soya Beans

AN EXTENSION MANUAL

Developed by the Ministry of Agriculture -Kenya in Conjunction with Department of Agricultural Extension, Ministry of Agriculture and Cooperatives -Thailand

Funded by JICA
Through AAKCP-RCDS

May, 2006

Table of Contents

1.0 Introduction

Kenya has bimodal rainfall and a range of altitudes that augment the production of tropical fruits such as mangoes, bananas, pineapple and papaya as well as temperate fruits and vegetables. Much of the fruits and vegetables that are produced are seasonal and are never all consumed as production is without reference to the market demand leading to glut and losses. Naturally fresh fruits and vegetables are perishable, have a low price when they are in the raw state, but can be processed into a range of high quality and value food products. Fresh fruits and vegetables are among the most accessible raw materials for processing done to alleviate spoilage and wastage, to increase foods diversity, and at times to improve the nutritional content of the fruits and vegetables. Criteria that determine whether a fruit or vegetable can be processed include:

1. Demand for the processed form of a particular fruit or vegetable
2. Biochemical characteristics of the fruit or vegetable (ability to withstand processing)
3. Sustained accessibility of the fruit or vegetable

The principle reasons for processing should be to retain as much of the nutrients as possible, make the product safe, improve the flavor and cook it to an edible state where necessary. The prevalent fruit and vegetable processing technologies include drying/ dehydration and use of acids, salts and sugars as the principal food preservatives of a chemical nature. Attention to quality, value, food safety, packaging methods and materials is a more difficult but feasible task as the most advanced food processing and preservation techniques may not save food from spoiling if living organisms, dirt or moisture slip in through faulty packaging or poor hygienic practices. Fruit and vegetable products despite having lower risks of food poisoning can be hazardous if not adequately and appropriately processed, and where strict hygiene is not observed within premises, among the processors and with the equipment, raw materials and the product. High quality raw materials: clean, mature, right colour, right size or shape depending on fruit or vegetable type, not moldy or bruised should be used to produce high quality processed products. Fruits or vegetable processing should not be seasonal hence integration of varied fruit and vegetable types harvested at different times of the year is encouraged. The processing plant too should be as close as possible to the raw material source to reduce transportation costs and handling injuries.

The principles of processing and preservation used for fruits and vegetables in the Thailand manual are similar to those used in Kenya. This includes drying to remove water or moisture from food, use of sugar, acid and salt to change the pH of the food so that micro-organisms do not find a favourable environment for growth. The ingredients used in the process of coming up with various products are also relatively similar with a few modifications or variations to the recipes. This results in changes in taste, flavour, texture and possibly the palatability and acceptability of these products by the local people. There is no recipe among those given that can be regarded as not feasible and together with those that are new, preparation and processing trial will be carried out to assess palatability, the shelf life, taste and flavour under local conditions.

This manual deals with some fresh fruit and vegetable processing techniques for preservation and value addition modified from Thailand with adaptation to Kenyan conditions. The fruits and vegetables discussed include mangoes, bananas, pineapple and paw paws, and tomatoes which are categorized as vegetables but are fruits considering the part that is utilized. Discussed too are processing techniques of soybean which has an enormous potential in Kenya as a health food. The principles and practices discussed herein incorporate those of the Bureau of Farmers Development, Department of Extension of Thailand and are not exhaustive.

1.1 Pickled Fruits and Vegetables

Pickled vegetables and fruits are fermented products that are produced in South and Central Asia, but in a very small scale in Kenya for the Asian community and a few affluent consumers. Nevertheless urbanization too is influencing the people's diet with people seeking a wider variety of foods; including pickled foods and also contributing to the international cuisine by exporting these processed foods. The history of fermented fruits and vegetables extends so far into antiquity that no precise time can be established for its origin. The particular fruits or vegetables used depend on availability and include red/white cabbage, cucumbers, onions, garlic, cauliflower, tomatoes, under ripe mangoes, grapes, peaches and pears.

The techniques of pickling are developments of ancient practices, which started in areas with long periods of fresh produce shortage due to prolonged cold or drought. The application of science to pickling and the use of names for the bacteria and yeasts present in fermenting vegetable substances started in the early 1900's. The major improvements in vegetable fermentation during the past 40 to 50 years began with developments in microbiological science about 100 years ago. These culminated with the conclusion that more than one species of lactic-acid bacteria were responsible for vegetable fermentation. The growth and fermentation by these species are influenced by environmental factors, especially salt concentration and temperature. The wrong temperature and/ or salt concentration can produce the wrong bacterial population resulting in soft and hollow pickles with off-flavours. This makes the process of making fermented pickles tricky.

Salt preservation is ancient, although methods of preparation and purification of salt are relatively recent innovations. Salt formerly was expensive and impure, often containing elements other than sodium and chlorine, as well as sand and soil. When low quantities of salt were added to vegetables, it must have been observed that the brines became cloudy and the product acquired an acid flavour. This flavour partially balanced the excessively salty flavour and, therefore, undoubtedly appealed to the consumer. Probably the vegetables were packed in brine solutions because dry salt failed to withdraw sufficient water from the vegetable pieces to cover them. The use of brine would permit settling out of sand and other insolubles introduced with the salt. Practices were far from standardized and from this beginning, it may be stated, three methods were developed, i.e., high-salt brine salting, low-salt brine salting and dry salting. Practices in homes continued for centuries with little standardization and household methods were passed on from mother to daughter.

1.2 The Action of Salt in Controlling Fermentations

Salt is one of the most important food additives in food preservation. The preservation action of salt involves the dehydration effect, the direct effect of the Chloride ion, reduced oxygen tension, and interference with the action of enzymes. In foods containing salt as a preservative, the salt is ionized, collecting water molecules about each ion, a process called ion hydration. The greater the concentration of salt, the more the water used to hydrate ions. A saturated salt solution (25% NaCl) at room temperature is one that has reached a point where no further energy is available to dissolve the salt. It has been postulated that there is no free water available for microbial growth at this point hence bacteria, yeasts and mold are unable to grow.

In fermentation, salt can play a role in sorting the microorganisms permitted to grow on the basis of salt tolerance. This is a well employed procedure in identification of bacteria and is functional in controlling fermentations too. Generally lactic acid bacteria, yeasts and molds either tolerate or adapt to moderate salt solutions. Spore forming aerobes and anaerobes are not tolerant to salt solutions, or they are sufficiently inhibited such that subsequent production of acid by lactic acid bacteria supplements the inhibitory influence of salt on spore forming bacteria as long as both conditions of salt and acid are operative. Proteolytic acid bacteria and pectolytic organisms are also inhibited by salt and acid solutions. However, these organisms are more sensitive to acid than salt. If salt tolerant and acidophilic mold is permitted to grow hence decreasing the acidity of the substrate, then putrefactive and pectolytic organisms can be anticipated to increase in numbers and cause food spoilage.
In many fermented food products, salt is commonly used in complementary action with vinegar and spices. The major sources of salt are categorized into three:

1. Solar salt is obtained by evaporation of salt water, either from the oceans or from inland salt lakes.
2. Mined salt, commonly referred to as rock salt, and is obtained from mines, operating a thousand feet and more below the surface of the earth.
3. Some salt is pumped from deeper subterranean salt deposits, using water as the transporting medium, and is called welled salt. Salt obtained from solar distillation contains chemical impurities and salt tolerant halophilic micro-organisms while mined and welled salts are generally free from these contaminating organisms.

1.3 Types of Pickles

Pickles may be grouped into three general classes as follows:

1. Sour pickles; prepared by reprocessing freshened salt stock with weak vinegar and packing into consumer units. A final acidity is maintained not lower than 2.5%
2. Sweet pickles; prepared as for sour pickles except that a sweet, spiced vinegar solution is added to freshened salt stock
3. Dill pickles; prepared by fermentation in a dilute brine flavored with dill herb and spices and are marketed in this brine rather than in vinegar. Such pickles are known as “genuine” dill pickles as distinguished from “process dill made from salt stock.

When fresh fruits and vegetables are placed into a watery solution, they will soften in 24 hr and begin a slow, mixed fermentation-putrefaction reaction. It is necessary to suppress undesirable microbial activity and create a favorable environment for the desired fermentation. The addition of salt permits the naturally present lactic acid bacteria to grow, thereby rapidly producing sufficient acid to supplement the action of the salt. One of the important changes that occur in the pickling process is that the fermentable carbohydrate is changed to acid. The level of acid developed ranges from 0.8 to 1.5%, expressed as lactic acid. The color changes, for example from bright green to an olive or yellow-green while the tissue changes to translucent from the normal chalky white and opaque. The texture of the food becomes firm and crisp but tender, with the development of a characteristic flavour.

The salt concentration is maintained at 8 to 10% during the first week, and increased by 1% a week thereafter until 16% salt is obtained in solution. It is to be noted that when equilibrium is established between the tissue and salt solution, the concentration of the latter slowly decreases. Constant vigilance is required in maintaining the salt concentration and inhibitive effect of the salt in solution in controlling the fermentation.

At the end of 4 to 6 weeks, after the fermentation is completed, the salt concentration is raised to about 16%. If properly controlled, the salted fermented fruits and vegetables, now called “salt stock”, may be held for several years.

1.3 Chutneys

Chutneys, another form of pickles, are made from fruits, vegetables or a mixture of both. They contain both sugar and vinegar to preserve them and to give a sweet-sour taste. They also contain spices used according to individual taste that are either aromatic or mild hot, or pungent. Spices mellow with age, and chutneys improve their flavour and taste on keeping. Good chutney should be smooth with a mellow flavour.

1.4 Preserves, Candies, Glazed and Crystallized Fruits

A Preserve is made by cooking whole or large pieces of properly matured fruit in heavy syrup until it becomes tender and transparent. In its preparation not less than 45 kg of the fruit are used for every 55 kgs of sugar, and cooking is continued until a concentration of at least 68 percent of soluble solids is achieved.

Freshly made preserves are wholesome and attractive. However, when kept in storage for long periods, their natural color and flavor deteriorate on account of oxidation changes. They should, therefore, be made only during the season of plenty unless there are adequate facilities for storing the fresh fruits so that they can be available in the off-season also. Preserves made from frozen fruits are generally superior in color and flavor to those made from fresh fruits stored at room temperature.

1.5 Cooking in syrup

There are three way of cooking a fruit in syrup, namely

(1) Open-kettle –long period process,
(2) Open-kettle-slow process, and
(3) Vacuum cooking process.
In all these processes care has to be taken to ensure that the fruit is kept covered with the syrup during cooking as well as afterwards, otherwise it will dry up and the quality of the product will be compromised.

1.5.1 Open-kettle long-period Process

To start with, the syrup in which the fruit is cooked should be of low sugar content. Boiling should be continued with gentle heating until the syrup thickens sufficiently. Rapid boiling will make the fruit tough, especially when heating is done in large shallow pans with only a small quantity of syrup. Soft fruits such as strawberries and raspberries which, unlike hard fruits (e.g. apples, pears, peaches, etc.) require little boiling, can, however, be safely cooked in heavy syrup. The final concentration of sugar should not be less than 68^0 Brix (soluble solids), which is achieved at a boiling point of 105^0 C. (at sea level). The main drawback of this simple and cheap process is that the flavor and color of the product suffer considerably during boiling.

1.5.2 Open-kettle Slow Process

The fruit is cooked in water until it becomes tender. Sugar equal to half the weight of fruit, is then put on the boiled pieces in alternate layers, and the mass allowed to stand for 24 hours in a vessel. The fruit gives out excess of water, and sugar goes into solution, giving a syrup of about 37^0 – 38^0 Brix. More sugar is added to raise the strength of the syrup to about 60^0 Brix. A small quantity of citric or tartaric acid is also added to invert a portion of the cane sugar. The whole mass is then boiled for 4 – 5 minutes and left for 24 hours. On the third day, the strength of syrup is raised to about 68^0 Brix, and the mass boiled again for 4 – 5 minutes. The fruit is then left in the syrup for 3 – 4 days. Finally, the strength of the syrup is raised to 70^0 Brix and the product packed in containers.

1.5.3 Vacuum Cooking

Preserves made by cooking under vacuum keep their flavor and color better than those made in the open kettles. In this process, the fruit is boiled to soften it before being placed in the syrup. To begin with, the syrup should be 30^0 – 35^0 Brix. It is subsequently concentrated under vacuum (along with the fruit) to 70^0 Brix. Hard fruits like apples and pears require slow boiling to facilitate the penetration of sugar, while soft fruits can be boiled briskly.

1.6 Cooling and Packing

If the preserve is to be stored in bulk, it should be cooled immediately after final boiling to avoid discoloration of the product. The fruit is drained from the syrup and put into dry containers. Freshly prepared boiling syrup of 68^0 Brix is then poured into the containers (jam jars-glass) which are exhausted for 8 – 10 minutes at 100^0 C. and there after sealed airtight.

If the preserve is packed scalding-hot in dry containers, subsequent sterilization may be omitted. In large-scale production, however, it is desirable to sterilize the sealed containers to exclude any chance of spoilage. The cans (or glass jam jars) may be sterilized for 25 minutes at 100^0C and cooled immediately afterwards. This can be done by completely submerging containers in boiling water (100^0 C) or keeping them in a hot oven (100^0 C).

1.7 Candied, Glazed, and Crystallized Fruits

A fruit impregnated with cane sugar and glucose, and subsequently drained and dried, is called candied fruit. Candied fruit covered with a thin, transparent coating of sugar which imparts to it a glossy appearance is called glazed fruit. When candied fruit is coated with crystals of sugar, either by rolling it in finely powdered sugar or by allowing the sugar crystals to deposit on it is called crystallized fruit.

1.7.1 Candy Making

The process for making candy is the same as that employed for preparing preserves, except that the fruit is impregnated with a higher percentage of sugar or glucose. A certain amount of invert sugar or glucose is substituted in place of cane sugar. The total sugar content of the impregnated fruit is kept at 75 percent to prevent fermentation. The process of impregnation with sugar must not be hurried through otherwise, the fruit would shrivel and sweat and become unfit for glazing and crystallizing.

Fruits and sugar are the main raw materials used for candy making. The most suitable fruits are those which possess pronounced flavor, such as pineapple, papaya, jack fruit, guava, mango, peach, peels of orange, lemon, grapefruit, cherry and ginger. Slightly unripe fruits should be used because fully ripe and over-ripe fruits develop jam-like consistency in the syruping process. Canned fruits of good quality can also be used.

1.7.2 Glazing

Syrup just sufficient for the glazing proves is made by boiling a mixture of cane sugar and water in the proportion of 2:1 in a pan at temperature of 113^0 – 114^0 C and skimming the impurities as these come up. Heating is then discontinued and the syrup cooled to 93^0 C. Granulation of the sugar is achieved by lapping the syrup with a wooden ladle on the side of the pan. Dried candied fruits are passed through this granulated portion of the syrup one by one with a fork, and placed on waxed tin sheets in a warm dry room. To hasten the process, the fruit may be dried in a drier at 120^0 F (50^0 C) for 2 – 3 hours. When it becomes hard, it is packed in airtight containers.

1.7.3 Crystallized Fruit

The process of ‘crystallizing’ candied fruit is quite different from that employed for glazing, but is similar to the crystallizing of confectionery. 70^0 Brix syrup is used. It is placed in a large deep vessel and allowed to cool at room temperature. To avoid premature granulation of sugar, a wax paper is placed on the surface of the syrup. The candied fruit is put in a wire tray which, in turn, is placed in a deep vessel. The cooled syrup is then gently poured covering the entire fruit. To prevent the fruit from floating, another wire tray is put on it, and a waxed paper is placed on the surface of the syrup.

The whole mass is left undisturbed for 12-18 hours at the end of which a thin crust of crystallized sugar will be formed. The tray containing the fruit is then removed carefully from the pan, and the surplus syrup drained off. The drained fruits are placed separately on wire trays and dried at room temperature or in a drier at 120^0 F (50^0 C).

1.8 Spoilage

There is a likelihood of spoilage occurring due to fermentation in the initial stages of preparation of preserves and candies when the percentage of sugar in the syrup is low. However, this can be controlled by boiling the product at proper intervals. If candied and glazed fruits are kept under humid condition they shed some of their sugar due to absorption of moisture from the air. Again, growth of mold takes place if they are packed in wet containers or if not sufficiently dried.

1.9 Packaging and storage

The shelf life of a candied glazed and crystallized fruit product is influenced to a large extent by its packaging, which must conform to certain special criteria: vis-à-vis
(a) Protection of the dehydrated product against moisture, light, air, dust, micro flora, foreign odor, insects and rodents;
(b) Strength and stability to maintain original container properties through storage, handling, and marketing;
(c) Size, shape, and appearance to promote stability of the product; composition approved for use in contact with foods; and
(d) Acceptable cost.

These products are packed in large units such as bags, drums, bins, cartons and cans. Heat-sealed polyethylene liners are usually required for bulk pack. For smaller retail market or catering packs, metal cans or foil-laminated, flexible pouches are used. In case of high-value products, small flexible containers prepared from three-poly laminates such as polyolefin-foil-mylar are recommended.

Dried candied, glazed and crystallized fruit should be quite dry and should be packed in moisture-proof tins. Dried candied, glazed and crystallized fruit are subject to insect attack even when they have been properly dried and stored .Insects not only consume the material but also leave much debris which spoils the appearance of the product. Beetles and moths are the most troublesome pests. The best way to avoid the infestation is to prevent their entry into the product. The important restorative method is heat treatment where these products are dipped in boiling water at the final stage of production and all insects are destroyed.

The examples of packaging materials for dried candied fruit are polyethylene or polypropylene plastic bags with 0.03 mm thickness.

1.10 Fruit Beverage

Juice and juice products from many fruits have been in production commercially for more than 50 years. The juice are primarily being consumed as breakfast drink by more people around the world as people are becoming more and more conscious of healthy foods. Fruit juice is a source of vitamin, minerals,

carbohydrates, amino acids, flavonoid compounds and probably other still unidentified constituents. The demand for fruit beverage is largely based on the nutritive value, flavor, aroma and color. These quality factors are dependent directly on the structure and chemical composition of the fresh fruit which depends largely on the combined influences of genetic regulatory mechanism and the physical chemical and biological environments to which the fresh fruits are subjected during growth and after harvest. Due to the difference in composition and the method of preparation, other names for the fruit beverage are used, such as fruit juice, nectars, squashes, fruit punches and cordials. Codex Alimentarius defines juice as "unfermented but fermentable juice, intended for direct consumption, obtained by the mechanical process from sound, ripe fruits, preserved exclusively by physical means. The juice may be turbid or clear. The juice may have been concentrated and later reconstituted with water suitable for the purpose of maintaining the essential composition and quality factors of the juice. The addition of sugars or acids can be permitted but must be endorsed in the individual standard." (Bates *et al;*2001). Table 1. lists some juice and juice-like terms and designations

Table 1: Some common juice designations.

Term	**Criteria**	**Remarks**
Pure juice 100%	All juice	No adjustment, not from concentrate
Fresh squeezed	Not pasteurized	Held refrigerated, Food safety concerns
Chilled, ready to serve	All juice	Held refrigerated, made from concentrate or pasteurized juice
Not from Concentrate	Single strength	Pasteurized after extraction
From concentrate	Made from concentrate	Reconstituted and pasteurized
Fresh frozen	Unpasteurized	Single strength, frozen after extraction
Juice blend	All juice	A mixture of pure juices
Puree	Pulp-containing	More viscous than juices, totally fruit
Nectar	Pulpy or clear	Sugar, water and acid added, 25 to 50% juice*

Nectar base	Requires reconstitution	Possesses sufficient flavour, acid and sugar to require water dilution for consumption*
Juice drink	Low in juice	Contains 10 to 20% juice*
Juice beverage	Low in juice	Contains 10 to 20% juice*
Juice cocktail	Low in juice	Contains 10 to 20% juice*
Fruit + ade	Lemonade	Contains >10% fruit juice, sugar and water*
Juice extract	Water extract	Fruit extracted by water, then concentrated*
Fruit punch	Token juice	~ 1% juice, + natural flavours
Natural flavoured	Token juice	Usually >1% juice

Source: Bates *et al;* 200

*Differing country standards for juice solids minimum.

1.11 Dehydration of Fruit

Drying is one of man's oldest methods of food preservation. It is also the most widely used method of food preservation. Drying is a process copied from nature; with some features of the operation being improved. Drying of foods yields highly concentrated material nutritionally. The dehydration of vegetables has become a well-established and growing industry but Kenya has yet to develop an economic capacity of fruit drying as only mango and cooking banana drying exist in low capacity.
"Dehydration" is at present defined industrially as drying by artificially produced heat under carefully controlled conditions of temperature, humidity, and air flow. To dehydrate means to remove water

1.11.1 Dehydration of fruits.

Fruits are either sun dried, spray dried or drum dried or dehydrated in cabinet or tunnel driers, but generally the latter method. All of the sun dried fruit is prepared in the tropics, and practically all of the artificially dried bananas are prepared in the tropics. In some instances the dried product may be reprocessed elsewhere. Reprocessing consists chiefly of heating the sieved product as a sanitary measure. Spray and drum dried fruit has a limited used in that it is sold in the form of a powder. Most of the banana powder produced is drum dried because entrainment and wall losses in spray drying are rather large. Banana powder may be mixed with chocolate or cocoa and dried milk to prepare a beverage. Ripe banana powder finds use in therapeutics in the treatment of celiac disease, and other forms of carbohydrate intolerances of this nature. It has also been

used in the adult diet for the treatment of certain intestinal disturbances. Banana flour is prepared from green (unripe) fruit or from plantains which contain large amount of starch. The market for banana flour is even less than that for banana powder.

1.11.2 Sun Drying of Fruits.

The preservation of foods by drying is one of the oldest and most important of the food industries. In fact, considerably more fruit is preserved by drying than by any other means. The natural sun drying of foods yields highly concentrated materials of enduring quality, yet a highly complex civilization can not be so dependent upon natural elements that are unpredictable. However, sun drying remains the greatest food preservation method. This method, used for both unripe and ripe fruit, is carried out by the natives in those countries where the fruit is raised. The peeled fruit is cut into small pieces, or split along the longitudinal axis. Knives made of bamboo or some nonferrous metal are used for cutting, to prevent discoloration. The cut pieces are placed on trays and allowed to remain in the sun for one or two days until the final moisture content is about 15 percent. The dried fruit may be put into a mortar, pounded until broken up and then sifted. Green, unripe bananas have been vacuum dried in the tropics, drying being completed in about 2 hours.

1.12.0 Packaging and Storage of Dried Fruits.

Packing is the most vital step for the success of the dehydration industry. The objectives of the operations of packing dried fruits has for its purpose the destruction of insects and insect eggs and the exclusion of insects from the packed products.

1.12.1 Packaging Fruits.

Fruits that have been sun dried are handled like products, i.e., in paperboard cartons. With waxed paper over wraps, moisture protection is sufficient for marketing purposes. Some fruits, such as raisins are packed in portion packages and multipacked in cellophane. Others employ aluminum foil lamination over wrap to obtain the dual benefit of decoration and moisture protection. Some may be packaged in transparent cellophane or cellophane/polyethylene pouches visible packaging is today better suited to the produce. Many fruits are dried to a specific moisture level, low enough to prevent spoilage but high enough to maintain softness for ready usage. Cellophane can be an adequate packaging material since the package contents' moisture content will remain almost constant. Accordingly, the film conforms to the dry fruit's shape without breaking or abrading due to the dry fruit's softness.

1.12.2 Storage of dried and dehydrated fruits.

The general practice in storage of dried fruits is to treat them like nonperishable commodities as they are delivered to the packer. The packaged dehydrated and dried fruits should be stored in a dark, dry, cool place as the lower the temperature (17^0 C)of storage, the longer the shelf life of the product. The well-ventilated room should be separate from other parts of the processing plant. Doors and windows should be screened, and every effort made to exclude dust and insects. If the foods are not stored

in metal containers, constant vigilance must be exercised against rodents, and rodent-proof systems instituted.
Certain abnormalities may occur in dried fruits stored under improper temperature and humidity conditions:

1. **Browning** is brought about by too high storage temperatures, but humidity does not seem to be a factor in bringing about this condition.

2. **Sugar crystallizing,** noticeable in raisins, figs and prunes, is characterized by the development of sugar crystals on the surface or within the flesh of the fruit. The condition retards the sale of such fruit because the customer perceives the sugar crystals as mold. When the sugar crystals develop under the skin of the fruit, they assume a red appearance which the traders call "red sugar". In raisins, the flesh has an objectionable granular texture. The main cause of sugar crystallizing is high humidity.

3. **Mold.** Will develop on some dried fruit at 23^0C and at 80 to 85% relative humidity. For this reason, humidity should not be higher than 50 to 60 percent.

1.12.3 Packaging and labeling

Good packaging and presentation encourages consumers to buy products. Packaging should provide the correct environmental conditions for food starting from the time food is packed through to its consumption. A good package should therefore perform the following functions:

1. It should provide a barrier against dirt and other contaminants thus keeping the product clean
2. It should prevent losses. For example, packages should be securely closed to prevent leakage
3. It should protect food against physical and chemical damage, for example, the harmful effects of air, light, insects, and rodents.
4. The package design should provide protection and convenience in handling and transport during distribution and marketing
5. A labeled package helps the customers to identify the food and instructs them how to use it correctly and on time ('use by' date).
6. The package should be appealing to the consumer.
7. The labeled package should serve as a communication vehicle to allow consumers to rapidly recognise the product or brand and should not mis-desribe the food.

2.0 RECIPES

2.1 Processed Mango Products

2.1.1 Mango Sauce

Raw material

1.	Ripe mango pulp	200	Grams
2.	Sugar	250	Grams
3.	Salt	50	Grams
4.	Chopped fermented red chili	250	Grams
5.	Chopped fermented garlic	40	Grams
7.	5% Vinegar	260	mL

Equipment

1.	Bowl	4. Knife	7. Gas stove	10. Blender
2.	Glass bottle/jar	5.Digital scale	8. Ladle	
3.	Sieve	6. Pot or pan	9. Wood paddle	

Preparation for fermented red chili and fermented garlic

Select ripe red chili ,cut off stem and peel the garlic

↓

Wash red chili and garlic

↓

Steam over heat of boiling water for 5 minutes

↓

Put red chili and garlic separately into wide neck glass bottles

↓

Add vinegar into the 2 bottles above then set aside for 20 days

Procedure

Wash ripe mango then boil for 10 min

↓

Peel and remove seed then pass the mango flesh through the sieve or blend

↓

Blend fermented garlic, fermented red chili, salt, sugar and vinegar thoroughly

↓

Mix the mixture above with the mango pulp

↓

Boil at 85 ^{o}C ,stirring occasionally for about 15 minutes, remove from the heat

↓

Using a ladle scoop immediately into prepared glass bottle
↓

Mango Sauce

Good characteristic of the product: The sauce texture should be smooth and homogeneous

Packaging and storage: Store in pasteurized glass bottle with tight lid
Store at room temperature

2.1.2 Mango Nectar

Raw material

1.	Ripe mango pulp	200	grams
2.	Sugar	109.4	grams
3.	Water	687	mL
4.	Citric acid	3.6	Grams

Equipments

1. Pot
2. Blender
3. Digital scale
4. Gas stove
5. Knife
6. Filter cloth sheet
7. 0.025 inch hold sieve
8. Ladle
9. Wood paddle
10. Thermometer

Procedure

Wash ripe mango then boil for 10 min
↓

Separate pulp from peel and seed
↓

Blend the mango pulp then filter through 0.025 inch mesh sieve or filter cloth sheet, set aside
↓

Prepare syrup by dissolving sugar in water and boil, then filter through filter cloth sheet
↓

go juice ,syrup and citric acid well
↓

Boil at 85 ^{o}C for 3 minutes

↓

Pour into the pasteurized bottle

↓

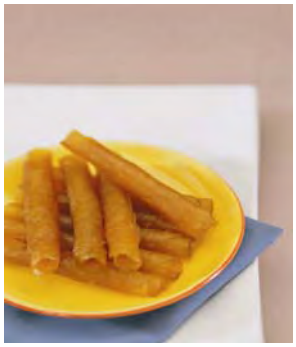
Mango Nectar

Good characteristic of the product: Color of the juice should be natural yellow

Packaging and storage: Hot fill pasteurized glass bottle and leave 3 mm headspace
Shelf life is 14 days in refrigerator

Weight per one recipe: 1 kilogram

2.1.3 Mango Leather



Raw material

1.	Ripe mango flesh	1	kilogram
2.	Sugar	80	grams
3.	Salt powder	6	grams
4.	Citric acid	1.5	grams

Equipments

1.	Brass pan	4. Gas stove	7. Wood paddle
2.	Blender	5. Knife	8. Ladle
3.	Digital scale	6. Chopping block	9. Plastic (polyethylene)sheet

Procedure

Wash ripe mangoes and peel

↓

Separate flesh from peel and seed then cut flesh into small pieces

↓

Blend the mango flesh then put into brass pan over low heat

↓

Add sugar ,salt powder and citric acid

↓

ıixture continuously to get homogeneous paste, remove from the heat

↓

Spread the mango paste into a thin circular piece on the surface of a plastic (polyethylene) sheet

↓

Dehydrate in the sunshine until product is dry then remove from plastic (polyethylene) sheet

↓

Mango Leather

Good characteristic of the product: No sugar crystals and the texture slightly soft and sticky

Packaging and storage: Keep in closed pack such as tightly closed plastic bag ,plastic box with tight cover etc, to prevent air and moisture and extend the shelf -life
Keep in low temperature

2.1.4 Spicy Mango Leather

Raw material

1.	Sweet mango leather	1	kilogram
2.	Sugar	120	grams
3.	Salt	15	grams
4.	Chili powder	5	grams
5.	Licorice powder	1	gram

Equipments

1. Stainless bowl
2. Knife
3. Chopping block
4. Digital scale
5. Ladle

Procedure

Sweet mango leather

↓

Roll and cut into long narrow strips

↓

Mix sugar, salt, chili powder and licorice powder thoroughly then mix with the mango leather strips

↓

Spicy Mango Leather

Good characteristic of the product: The size of the mango strips should be even and well mixed with the other ingredients

Packaging and storage: Keep in closed pack such as vacuum pack or thick plastic bag to prevent air and moisture and extend the shelf -life
Keep in low temperature

2.1.5 Mango Jam

Raw material

1.	Ripe mango flesh	1	kilogram
2.	Citric acid	1.1	grams
3.	Sugar	1.28	kilogram
4.	Pectin powder	20	Grams
5.	Water		

Equipments

1.	Pot	4. Stove	7. Refractometer
2.	Wood paddle	5. Knife	8. Thermometer
3.	Digital scale	6.Chopping block	9. pH meter

Procedure

Wash ripe mango, peel, remove seed and cut into small pieces
↓

Boil the mango flesh in the pot
↓

Mix Pectin powder with 2 times of sugar and 7 times of water
then melt the mixture by boiling
↓

Add into the pot of mango flesh and boil over heat ,stirring continuously
↓

aining sugar then stir continuously until the mixture boils again
uble solid is 65-70 ^{o} brix at 103 – 104 ^{o}C
↓

Add citric acid until pH 2.8 – 3.3
↓

Allow to cool
↓

Mango Jam

Good characteristic of the product: Semisolid texture, no crystal
Packaging and storage: Pour into wide neck glass bottle when the product's temperature is 84 ^{o}C and leave 3 mm head space. Cover tightly then turn bottle over for 2 minutes to remove air in the bottle
Keep in low temperature

2.1.6 Mango Jelly

Raw material

1.	Ripe mango juice	100	grams
2.	Sugar	75	grams
3.	Caragenan	5	grams
4.	Citric acid	1	Gram
5.	Water	319	mL

Equipments

1.	Knife	4. Thermometer	7. Pot
2.	Refractometer	5. Digital scale	8. Stove
3.	Juice extractor or Blender	6. Chopping block	9. Refrigerator

Procedure

Wash ripe mango, peel, remove seed and cut into small pieces
↓

Blend and filter to separate the flesh and juice , set aside
↓

Mix sugar, caragenan and citric acid well
↓

Boil 319 mL.of water to 90 ^{o} C

↓ ↓

Slowly add mixture of sugar, caragenan and citric acid into boiling water (gently boil over low heat)

↓ ↓

Add mango juice

↓ ↓

Boil until the juice reaches 80 ^{o} C

↓ ↓

Pour into the mold then allow to cool for 30 minutes

↓ ↓

Chill until required

↓ ↓

Mango Jelly

Good characteristic of the product: Jelly texture should be clear, smooth
Packaging and storage: Keep in the refrigerator
Weight per one recipe: 500 grams.

2.1.7 Mango Chutney

Raw material

1.	Ripe mango flesh	1	Kilogram
2.	Vinegar	1/2	Cup
3.	Sugar	1	Cup
4.	Salt	5	Grams
5.	2 pieces Redchillies,2 tsp ground ginger,1 clove garlic crushed,1/2 cup raisins		

Equipments

1. Pot
2. Wood paddle
3. Digital scale
4. Stove
5. Knife
6. Chopping block
7. Ladle

Procedure

Wash ripe mango, peel, remove seed and cut into small pieces
↓

Simmer the mango flesh in the pot together with the vinegar for 10 minutes
↓

Add the sugar, chillies, ginger and garlic and cook gently for 30 minutes stirring constantly.
↓

Add into the pot the raisins and salt and cook for an additional five minutes until the chutney is thick.
↓

ith a ladle into clean hot glass jars
↓

Mango chutney

Good characteristic of the product:	Semisolid texture, no crystal
Packaging and storage:	Pour into wide neck glass bottle when the product's temperature is 84 ^{o}C and leave 3 mm head space. Cover tightly then turn bottle over for 2 minutes to remove air in the bottle Keep in low temperature

*Alternate ripe mango with unripe mango or with pineapples, or with ripe or green tomatoes, or with paw paws or with bananas for varied chutneys.

2.2.0 Processed Banana Products

2.2.1 Banana Chips

Raw material

1.	Unripe banana(cooking type)	1	kilogram
2.	Sugar	500	grams
3.	Water	1	Litre
4.	Salt	20	Grams
5.	Sweetened condensed milk	50	Grams
6.	Palm oil or vegetable oil	50	Grams

Equipments

1.	Pan	4. Slicer (manual)	7. Flipper
2.	Knife	5. Digital scale	8. Ladle or wood paddle
3.	Bowl	6. Sieve	

Preparation of syrup
Simmer all sugar, water, salt and sweetened condensed milk over heat until boiling

Procedure

Peel the banana and slice thinly
↓

Soak in 1% salt solution for 30 minutes, then half - dry on the sieve
↓

Fry in palm oil until nearly cooked ,do not allow to crisp
↓

Soak banana in the prepared syrup for 10 minutes then drain banana
↓

Fry banana again over low heat until reddish brown
↓

Drain banana and allow to cool
↓

Banana chips

Good characteristic of the product: Banana chips should be crispy and reddish brown in color

Packaging and storage: Keep in closed pack such as tightly closed plastic bag ,plastic box with tight cover etc to prevent air, moisture and extend the shelf -life
- Keep in low temperature

2.2.2 Sugar Coated Banana Chips

Raw material

1.	Unripe banana	15	fruits
2.	Sugar	100	grams
3.	2 % salt solution		
4.	Vegetable oil		
5.	Water		

Equipments

1.	Pan	4. Slicer (manual)	7.Bamboo tray
2.	Stove	5. Wood paddle	8.Digital scale
3.	Knife	6. Ladle	9. Flipper

Procedure

Wash unripe banana
↓

Peel, and wash with 2% salt solution
↓

Slice the banana thinly
↓

Fry in hot oil until crispy
↓

Drain the banana from oil
↓

Coat with sugar while the banana are still hot
↓

Sugar Coated Banana Chips

Good characteristic of the product: The texture should be crispy and coated by sugar evenly

Packaging and storage: Keep in closed pack such as tightly closed plastic bag ,plastic box with tight cover etc to prevent air and moisture and extend the shelf -life
- Keep in low temperature

2.2.3 Sweet Banana Paste

Raw material

1.	Ripe banana	30	fruits
2.	Cane sugar	1000	grams
3.	Concentrate coconut milk Or (Desiccated coconut (1000 grams)	500	grams

Equipments

1.	Brass pan	3. Stove	5. Knife
2.	Wood paddle	4. Scale	6. Blender or Chopping block

Procedure

Wash ripe banana
↓

Peel, Chop or blend the banana flesh ,set aside
↓

Mix desiccated coconut with water and squeeze to get
500 grams concentrate coconut milk
↓

Mix banana pulp, cane sugar and coconut milk in the brass pan
↓

Stir over gentle heat until it becomes dry and sticky
(the mixture can be molded)
↓

↓

Sweet Banana Paste

Good characteristic of the product: The texture should be soft and sticky and with good banana aroma

Packaging and storage: Keep in closed pack such as tightly closed plastic bag ,plastic box with tight cover etc to prevent air and moisture and extend the shelf -life
- Keep in low temperature

2.2.4 Banana and Papaya Jam

Raw material

1.	Ripe Banana pulp	100	grams
2.	Ripe Papaya pulp	100	grams
3.	Sugar	250	grams
4.	Citric acid	3	grams

Equipments

1.	Brass pan	4.	Stove
2.	Wood paddle	5.	Digital scale
3.	Blender	6.	Knife

Procedure

Wash banana and steam for 10 minutes

↓

Peel, then set aside

↓

Peel papaya and remove seeds

↓

Blend papaya and banana flesh then put into brass pan

↓

Add sugar and citric acid to the mixture and boil over heat until gel is set
(Check gel setting by using wood paddle drawing the mixture

and observing flow characteristic)
↓

Pour into the prepared bottle
↓

Banana and Papaya Jam

Good characteristic of the product: Semisolid texture, no sugar crystal
Packaging and storage: Pour into wide neck glass bottle when the product's temperature is 84 ^{o}C and leave 3mm head space. Cover tightly then turn bottle over for 2 minutes to remove air in the bottle
- Keep in low temperature

2.2.5 Buttered Banana Chips

Raw material

1.	Unripe banana	1	kilogram
2.	Sugar	150	grams
3.	Salt	2	grams
4.	Vegetable oil	3	liters
5.	Water		
6.	Vinegar	2	Tablespoons
7.	Margarine	3	Tablespoons

Equipments

1.	Bowl	4. Tray	7. Pot	10. Digital scale
2.	Pan and stove	5. Winnowing basket	8. Teaspoon and teaspoon	
3.	Knife	6. Flipper	9. Slicer (manual)	

Procedure

Wash and peel unripe banana then soak in the mixture of water and vinegar
(2 liters water + 2 tablespoon vinegar) for 5 minutes
then wash with clean water and drain
↓

Slice banana thinly, keep in tightly closed plastic bag for 12 hrs
↓

Dissolve sugar and salt in water then boil over gentle heat until dry up

↓

Add margarine ,stir continuously until completely dissolved
then remove from the heat

↓

Dip the banana into the sugar, salt and margarine solution
then fry in hot oil over medium heat until crispy

↓

Drain banana chips on winnowing basket and allow to cool

↓

Buttered Banana Chips

Good characteristic of the product: Crispy texture

Packaging and storage:
- Keep in closed pack such as tightly closed plastic bag ,plastic box with tight cover etc to prevent air and moisture and extend the shelf -life
- Keep in low temperature

2.2.6 Banana fruit rolls

Raw material

1.	Ripe banana pulp	1	kilogram
2.	Sugar/honey	80	grams
3.	Salt powder	6	grams
4.	Citric acid	1.5	grams
5.	Pectin	10	grams

Equipments

1. Brass pan 4. Gas stove 7. Wood paddle

2. Blender 5. Knife 8. Ladle
3. Digital scale 6. Chopping block 9. Plastic (polyethylene) sheet

Procedure

Wash ripe bananas, blanch and peel

↓

Cut banana into small pieces

↓

Blend the banana then put into brass pan over low heat

↓

Add sugar/honey, salt powder, pectin and citric acid

↓

Stir mixture continuously to get a homogeneous puree, remove from the heat

↓

Spread the banana puree into a thin circular piece on the surface of a plastic (polyethylene) sheet

↓

Dehydrate in the sunshine until product is dry then remove from plastic (polyethylene) sheet

↓

Cut the banana leather into stripes then roll

↓

Banana fruit rolls

Good characteristic of the product: No sugar crystals and the texture slightly soft and sticky

Packaging and storage: Keep in closed pack such as tightly closed plastic bag, plastic box with tight cover etc, to prevent air and moisture and extend the shelf -life

Keep in low temperature

2.3.0 Processed Papaya Products

2.3.1 Papaya Jam

Raw material

		Recipe1	Recipe 2	
1.	Ripe papaya pulp	400	400	grams
2.	Sugar	800	800	grams
3.	Pectin powder	8.4	8.4	grams
4.	Citric acid	8.4	7	grams
	Or lemonade	100	----------	c.c.
5.	Water	200	----------	grams
6.	Salt	2.1	----------	grams
7.	Pineapple flesh	----------	200	grams

Equipments

1. Brass pan or stainless pot
2. Wood paddle
3. Refractometer
4. Stove
5. Knife
6. Digital scale

Procedure

Wash ripe papaya ,peel, remove seeds and cut into small pieces

↓

↓

Put papaya flesh in brass pan then boil over gentle heat

↓

Weigh sugar divide into 2 parts, One part mix well with pectin powder

↓

Another part of sugar add into the papaya flesh ,stir until sugar is dissolved

↓

Slowly add the mixture of sugar and pectin powder then stir continuously until sugar and pectin are completely dissolved and dried up

↓

Add citric acid ,stir continuously until gel is set
and total soluble solid is 65 ^{o} brix

↓

Papaya Jam

Good characteristic of the product: The texture should be smooth, viscous and homogeneous. No sugar crystal

Packaging and storage:
- Pour into wide neck glass bottle while jam is 84 ^{o}C and leave 3 mm head space Cover tightly then turn bottle over for 2 minutes to remove air in the bottle
- Keep in low temperature

2.3.2 Papaya Sauce

Raw material

1.	Ripe papaya flesh	1.5	kilograms
2.	Sugar	120	grams
3.	Salt	5	grams
4.	Blended black pepper	30	grams
5.	Chopped garlic	30	grams
6.	Vinegar	200	cc.
7.	Spice 2 grams each (cinnamon, coriander seed, nutmeg, cardamom, clove powder and pepper)	12	grams

Equipments

1.	Blender	4. Filter cloth sheet	7. Knife
2.	Pan	5. Stove	8. Digital scale
3.	Wood paddle	6. Pot	

Procedure

Peel papaya ,remove seeds and blend papaya flesh
↓

Boil fine papaya paste over gentle heat
↓

Add ground black pepper ,ground garlic ,sugar and salt to the papaya paste
↓

Pack all spices with filter cloth sheet then put into the pot with the mixture
↓

Add vinegar then simmer continuously then close the lid
↓

Papaya Sauce

Good characteristic of the product: The sauce texture should be smooth and homogeneous

Packaging and storage:
- Store in pasteurized glass bottle with tight cover
- Keep in room temperature

2.3.3 Sweet Papaya Leather

Raw material

1.	Ripe papaya flesh	1	kilogram
2.	Sugar	80	grams
3.	Salt	2	grams
4.	Citric acid	2	grams
	or lemonade	25	ml

Equipments

1.	Digital scale	5. Stove	
2.	Pan	6. Knife	
3.	Wood paddle	7. Blender	
4.	Tray	8. Digital scale	

Procedure

Wash ripe papaya
↓

Peel, remove seeds and blend the flesh
↓

Boil the papaya flesh over gentle heat to evaporate water
↓

Add all ingredients and stir continuously until it becomes thick (around 1 hour)
↓

Spread thick papaya mixture thinly on the tray
↓

Dehydrate in the sunshine until product dries
↓

Sweet Papaya Leather

Good characteristic of the product: No sugar crystal and the texture slightly soft and sticky

Packaging and storage:
- Keep in closed pack such as tightly closed plastic bag ,plastic box with tight cover etc to prevent air and moisture and extend the shelf -life
- Keep in low temperature

2.3.4 Sweet and Sour Dried Papaya

Raw material

1.	Unripe papaya flesh	1	kilogram
	Ingredient for fermentation step		

2.	Sugar	600	grams
3.	Salt	100	grams
4.	Citric acid	10	grams
	Ingredient for glazing		
1.	Blended sugar	400	grams
2.	Cassava flour	30	grams
3.	Salt	12	grams
4.	Citric acid	10	grams

Equipments

1.	Knife	4. Stove	7. Digital scale
2.	Pan	5. Pot	8. Chopping block
3.	Strainer	6. Sieve	

Procedure

Wash unripe papaya ,peel, remove seeds and cut into 3 mm. thick long strip
↓

Scald in boiling water for 4 minutes then drain the papaya
↓

Mix papaya strips with fermented syrup for 24 hours
↓

Drain and wash the papaya strip with water
↓

Dry the papaya in the sunshine
↓

Mix dried papaya with glazing mixture
↓

Sweet-en-Sour Dried Papaya

Good characteristic of the product: The texture should not too soft or too hard

Packaging and storage: Keep in closed pack such as tightly closed plastic bag ,plastic box with tight cover etc to prevent air and moisture and extend the shelf -life
- Keep in low temperature

2.3.5 Glazed Papaya

Raw material

1.	Unripe papaya flesh	1	kilogram
2.	Sugar	1	kilogram
3.	Water	4	Cups
4.	Calcium chloride solution		

Equipments

1.	Knife	4.	Refractometer	7.	Filter cloth sheet	10.	Thermometer
2.	Pot	5.	Stove	8.	Cup		
3.	Sieve	6.	Chopping block	9.	Scale		

Procedure

Prepare 35^{o} brix syrup for 1 litre in which the fruit is cooked.
(Boiling over gentle heat)
↓

Wash papaya, peel and remove seeds
↓

Cut them into halves.
↓

Add into prepared syrup
↓

Boil over gentle heat until the concentration of sugar reaches 68 ^{o} brix.
↓

Dry in the sunshine or oven at 60^{o} C until product's surface is not sticky.

Good characteristic of the product: The surface should be smooth and no sugar crystal

Packaging and storage: Keep in closed pack such as tightly closed plastic bag ,plastic box with tight cover etc to prevent air and moisture and extend the shelf -life
- Keep in low temperature

2.3.6 Papaya Fruits Salad

Raw material

1.	Ripe papaya flesh	1	cup
2.	Tangerine	1	fruit
3.	Banana	1	fruit
4.	Honey	½	cup
5.	Lemonade	1	tablespoon

Equipments

1. Bowl
2. Knife
3. Chopping block
4. Cup

Procedure

Wash the ripe papaya ,tangerine, and banana

↓

Peel all fruits, remove seeds and cut into 1 cm^3 cubes

↓

Mix honey with warm water and lemonade then chill in refrigerator

↓

Pour syrup mixture with fruit

↓

Papaya Fruit Salad

2.4 Processed Tomato Products

2.4.1 Concentrated Tomato Juice

Raw material

1.	Tomato flesh	1	kilogram
2.	Sugar	600	grams
3.	Salt	1	tablespoon
4.	Water	500	ml

Equipment

1. Blender or sieve
2. Pot
3. Wood paddle
4. Filter Cloth sheet
5. Stove
6. Ladle
7. Scale

Procedure

Wash tomato and scald in boiling water for 1-2 minutes
↓

Peel tomato and blend tomato flesh
↓

Add sugar syrup and salt
↓

Boil until boiling point
↓

Pour into pasteurized glass bottle
↓

Concentrated Tomato Juice

Good characteristic of the product: The color should be clear natural red and homogeneous

Packaging and storage:
- Hot filling and leave 3mm head space
- Shelf life is 14 days in refrigerator

2.4.2 Tomato Juice

Raw material

1.	Tomato flesh	500	grams
2.	Sugar syrup	150	grams
3.	Boiled water	2000	mL
4.	Salt	20	grams

Equipment

1.	Blender	3. Chopping block	5. Digital scale
2.	Knife	4. Scale	6. Ladle

Procedure

Wash tomato and cut into small pieces
↓

Blend tomato flesh
↓

Add sugar syrup and salt
↓

Tomato Juice

Good characteristic of the product: The texture should be clear red and homogeneous

Note: Should consume immediately

2.4.3 Glazed Tomato

Raw material

1.	Tomato	20	kilograms
2.	Sugar	10	kilograms
3.	Salt	2	cups
4.	Citric acid	20	grams
5.	Calcium chloride solution	22	kilograms
6.	Water	10	Litres

Equipments

1. Knife
2. Pot
3. Hot air oven
4. Stove
5. Scale
6. Ladle
7. Scale

Procedure

Wash the tomato then cut each tomato into quarter , do not cut right down to the base then remove seeds

↓

Soak in Calcium chloride solution for 3 hours

↓

Drain the tomato then wash with clean water and scald in boiling water for 1 min.

↓

Prepare the sugar syrup by adding 10 kilogram of sugar in 10 litres of water
Boil the solution until sugar's completely dissolved

↓

Add tomato flesh and citric acid

↓

Boil the tomato until tomato flesh float on top of the syrup

↓

Drain the tomato and dry at 60-70 ^{o} C until the tomato is completely dried

↓

Glazed Tomato

Good characteristic of the product: The surface should be smooth and no sugar crystal

Packaging and storage: Keep in closed pack such as tightly closed plastic bag ,plastic box with tight cover etc to prevent air and moisture and extend the shelf -life
- Keep in low temperature

2.4.3 Tomato Sauce

Raw material

1.	Ripe Tomato	2	kilograms
2.	Sugar	6	grams
3.	Salt	6	grams
4.	Vinegar	1	ml
5.	Spice (all packed in cloth sheet)		
	- Pepper, Chopped ginger, Cinnamon	3	grams each
	- Nutmeg	6	grams
	- Clove powder	1.5	grams
	- Cardamom	1.5	grams

Equipments

1. Blender
2. Pan
3. Wood paddle
4. Filter cloth sheet
5. Stove
6. Sieve

Procedure

Scald tomato in boiling water for 2 minutes then soak in cold water

↓

Peel the tomato skin then blend into paste

↓

Simmer the tomato paste and stir continuously over medium heat
Then pass through the sieve

↓

Add spice pack into the tomato pot and simmer again
until the mixture has spice aroma then remove spice pack

↓

Add sugar, salt and vinegar and mix thoroughly until dissolved

↓

Stir continuously for 30-40 minutes until the paste become more viscous

↓

Tomato Sauce

Good characteristic of the product:	The sauce texture should be smooth and homogeneous
Packaging and storage:	Store in pasteurized glass bottle with tight cover Keep in room temperature

2.5 Processed Pineapple products

2.5.1 40 % Pineapple Nectar

Raw material

1.	Pineapple juice	400	grams
2.	Sugar	92.2	grams
3.	Boiled water	506	mL
4.	Citric acid	1.8	Grams

Equipment

1.	Knife	5. Blender/Juice extractor	9. Ladle
2.	Pot	6. Stove	10. Wood paddle
3.	Thermometer	7.Digital scale	11. Chopping block
4.	Filter cloth sheet	8. Sieve	

Procedure

Wash the pineapple, peel and remove eyes
↓

Blend or chop into small pieces
↓

Crush the pineapple, separate the flesh and juice ,set aside
↓

Prepare the syrup by boiling sugar with water until sugar completely dissolve
↓

apple juice with syrup and citric acid
↓

Boil at 85 ^{o} C for 3 minutes
↓

Pour into the pasteurized glass bottle
↓

40% Pineapple Nectar

Good characteristic of the product:	- Color of the juice should be clear slightly yellow and homogeneous - have slightly sweet and sour taste
Packaging and storage:	Hot filling in pasteurized glass bottle and leave 3mm head space - Shelf life is 14 days in refrigerator

2.5.2 Pineapple Squash

Raw material

1.	Ripe pineapple	400	grams
2.	Sugar	385.8	grams
3.	Boiled water	202	mL
4.	Citric acid	8.4	grams
5.	Sodium benzoate	0.8	grams
6.	C.M.C. (Carboxy methyl cellulose)	3	grams

Equipments

1.	Knife	4. Filter cloth sheet	7. Chopping block
2.	Pot	5. Stove	8. Digital scale
3.	Thermometer	6. Blender/Juice extractor	

Procedure

Wash the pineapple, peel and remove eyes
Chop into small pieces and blend finely
↓

Squeeze the pineapple separate the flesh and juice
and filter through filter cloth sheet ,set aside

Mix sugar (10 g.), citric acid, sodium benzoate and C.M.C thoroughly
↓

Dissolve the remaining sugar in water and boil over heat
↓

Add the mixture of sugar, citric acid, sodium benzoate and C.M.C and
boil continuously until boiling point, remove from the heat then filter
↓

Mix with pineapple juice and boil at 80 ^{o} C

↓

Pour into the pasteurized glass bottle

↓

Pineapple Squash

Good characteristic of the product:
- Color of the juice should be clear slightly yellow and homogeneous
- have slightly sweet and sour taste

Packaging and storage:
- Hot filling pasteurized glass bottle and leave 3 mm head space
- Mix 1 part of pineapple squash to 2 parts of water before serving

2.5.3 Pineapple Jam

Raw material

1.	Pineapple flesh	1000	grams
2.	Sugar	750	grams
3.	Citric acid	3	grams

Equipments

1.	Brass pan or stainless pot	4. Stove	7. Chopping Block
2.	Wood paddle	5. Knife	8. Digital scale
3.	Refractometer	6. Thermometer	9. Blender

Procedure

Wash ripe pineapple

↓

Peel, remove eyes and core then blend or chop the flesh

↓

Boil the pineapple flesh and citric acid over gentle heat until the flesh become soft

↓

Add sugar and increase heat until the temperature reaches 105 ^{o} C (until gel sets)

↓

Pour in pasteurized glass bottle

↓

Pineapple Jam

Good characteristic of the product: The texture should be smooth, viscous and homogeneous. No sugar crystal

Packaging and storage:
- Pour into wide neck glass bottle during the product's temperature is 84 ^{o}C and leave 3 mm head space. Cover tightly then turn bottle over for 2 minutes to remove air in the bottle
- Keep at low temperature

2.5.4 Pineapple Jelly

Raw material

1.	Pineapple juice	1000	grams
2.	Sugar	500	grams
3.	Pectin	15	grams
4.	Citric acid	1-2	grams

Equipments

1.	Knife	4. Thermometer	7. Pot
2.	Refractometer	5. Digital scale	8. Stove
3.	Juice extractor or Blender	6. Chopping block	9. Refrigerator

Procedure

Mix all ingredients thoroughly and filter through filter cloth sheet

↓

Boil over strong heat at 105 ^{o} C

↓

Pour into the mold then allow to cool for 30 minutes

↓

↓

Chill until required
↓

Pineapple Jelly

Good characteristic of the product: Jelly texture should be clear, smooth
Packaging and storage: Keep in refrigerator

2.5.5 Sweet Pineapple Paste

Raw material

1.	Ground Pineapple	2.5	Kilograms or
2.	Chopped pineapple flesh	2.5	Kilograms
3.	Salt	2	Tablespoons
4.	Sugar	2	Kilograms
5.	Citric acid	2-3	Tablespoons

Equipments

1.	Knife	4. Stove	7. Chopping block
2.	Brass pan	5. Tea spoon	
3.	Wood paddle	6. Scale	

Procedure

Wash ripe pineapple
↓

Peel, remove eyes and core then blend or chop the flesh
↓

Put Pineapple flesh in the pan ,add all ingredients then mix together
↓

Boil the mixture over gentle heat ,stir continuously until
the mixture become sticky and dry, remove from the heat
↓

Sweet Pineapple Paste

Good characteristic of the product:	the sauce texture should be smooth and no sugar crystal
Packaging and storage:	Keep at room temperature

2.6 Processed Soybean Products

2.6.1 Soy Milk

Raw material

1.	Soybean	1	kilogram
2.	Sugar	1	kilogram
3.	Boiled water	12	litres
4.	Pandanus leaf	5	leaves

Equipments

1.	Blender	4. Stove	7. Ladle
2.	Pot	5. Filter cloth sheet	8. Wood Paddle
3.	Knife	6. Blow	9. Scale

Procedure

Soak soybean in clean water for 6 hours

↓

Clean the bean and remove bad seed and foreign materials, drain water

↓

Blend all soybean with 12 litres of water

↓

Filter to separate soybean milk from its ground

↓

Put pandanus leaf into soybean milk and boil over heat
stir continuously until boiling point then add sugar

Stir until sugar dissolves and boil again

Soymilk

Good characteristic of the product: The texture should be smooth, viscous and homogeneous. No sugar crystal

Packaging and storage: Keep in refrigerator

2.6.2 Soybean Cracker

Raw material

1.	Ground Soybean	2-3	cups
2.	Cassava flour	1	cups
3.	Chopped garlic	60	pieces
4.	Pepper	2	tablespoons
5.	Boiled water		

Equipments

1.	Blender	4. Chopping block	7. Teaspoon
2.	Knife	5. Stove	8.Wood paddle
3.	Pan and stove	6. Cup	

Procedure

Clean soybean and remove foreign material

↓

Soak soybean in hot water for 1 hour

↓

Steam the soybean

↓

Blend garlic, pepper, salt and add soybean then blend again

↓

Mix cassava flour and the soybean mixture with hot water

↓

Knead the mixture well and mold the dough into cylinder shape whose diameter is about 3 mm

↓

Steam the dough

↓

Slice into thin piece and dry at 65-75 ^{o} C until the product dry

↓

↓

Fry in hot vegetable oil around 4-5 seconds

↓

Soybean Cracker

Good characteristic of the product: Crispy texture

Packaging and storage: Keep in package that can prevent air and moisture

2.6.3 Soybean Cookie

Raw material

1.	Butter	½	cups
2.	Sugar	½	cups
3.	Egg	2	eggs
4.	All purpose flour	2	cups
5.	Baking powder	½	teaspoons
6.	Salt	½	teaspoons
7.	Vanilla powder	2	teaspoons
8.	Ground Soybean	1	cup

Equipments

1. Mixer
2. Sieve
3. Paddle
4. Tray
5. Oven
6. Teaspoon
7. Cup

Procedure

Sieve flour, salt and vanilla together 3 times

↓

Cream butter together with sugar adding sugar slowly

↓

Add egg one by one then add vanilla powder

↓

Slowly add flour into the cream

↓

Pour into grease mold

↓

Bake at 375 ^{o} F for 20 minutes

↓

Take the cookie out from the oven and let it cool down

↓

Soybean Cookie

Good characteristic of the product:	Crispy texture and good soybean aroma
Packaging and storage:	Keep in package that can prevent air and moisture

2.6.4 Soybean Pudding

Raw material

1.	Soybean	1		kilogram
2.	Milk	11		cups
3.	Sugar		½	cups

Equipment

1.	Blender	4. Filter cloth sheet	7. Scale
2.	Pot	5. Stove	8. Ladle
3.	Paddle	6. Cup	

Procedure

Blend soybean with 25 cups of water
↓

Filter the mixture
↓

Mix soybean ground from the first step with soybean milk from the second step to get the concentrated soybean milk
↓

Mix 1 cup of soybean milk with 1 cup of milk and ½ cup of sugar
↓

Boil the mixture until reach boiling point
↓

Pour in to the glass just 1/3 of the net volume set aside to cool down and allow it to set
↓

Mix 10 cups of soybean milk with 10 cups of milk and the remaining sugar
↓

Boil the mixture until boiling point and set aside to cool down
↓

Pour into the glass then add fruit salad
↓

Soybean Pudding

Good characteristic of the product: Smooth texture
Packaging and storage: Keep in refrigerator

2.6.5 Soybean Dressing Salad

Raw material

1.	Concentrate soybean milk	¾	cup
2.	Egg yolk	2	eggs
3.	Salt	1	tablespoon
4.	Pepper	1	teaspoon
5.	Lemonade	¼	cup
6.	Sugar	¼	cup

Equipment

1. Blender
2. Teaspoon
3. Tablespoon

Procedure

Mix lemonade, salt, sugar and pepper thoroughly
↓

Whip egg yolk and concentrated milk together and alternatively add the mixture of lemonade, salt, sugar and pepper
↓

Whip the mixture until salt and sugar completely dissolve
↓

Pour in to the prepared package and keep in refrigerator
↓

Soybean Dressing Salad

Good characteristic of the product: Smooth, viscous and homogeneous texture

Packaging and storage: Keep in refrigerator

2.6.6 Soybean Pancake

Raw material

1.	Coconut milk	3	cups
2.	Cane sugar	1	cup
3.	Egg	2	eggs
4.	Rice flour	2	cups

5.	Salt	½	teaspoon
6.	Soybean ground	2	cups
7.	Honey		

Equipment

1.	Mixer	4.	Cup
2.	Mold	5.	Teaspoon
3.	Stove	6.	Pan

Procedure

Mix soybean ground, rice flour, coconut milk, sugar and salt thoroughly

↓

Whip the egg then pour the first mixture

↓

Mix thoroughly

↓

Pour into the greased mold or pan and toast it

↓

Serve with honey

↓

Soybean Pancake

Good characteristic of the product: Smooth and soft texture and good aroma

Packaging and storage: Pack in plastic bag and keep in refrigerator or room temperature

3.0 Conclusion

Most of the recipes especially on banana are relatively new but bear similar food processing principles. All recipes shall be tested and tried for marketability and stability on storage under local conditions and be promoted for food processing activities as a potential source of livelihood through creating employment and income generation.

References

Bates R.P.; Morris J.R. and Crandall P.G**. (2001)** Principles and practices of small - and medium - scale fruit juice processing. FAO Agricultural Services Bulletin No. 146.

Bureau of Farmers Development, Department of Extension of Thailand **(2005)**- *A Manual of Fruits and Vegetables Processing* for participants of Kenya under AAKCP –RCDS

Food Chain 21 **(2002)** Adding Value to Bananas. *The International Journal of Small Scale Food Processing.* Intermediate Technology Development Group.

Zakaria Che Rahani and Sam Rahil Mohd. Post harvest and processing for the diversification of income. Innovation and uptake (Posters)- **P91** - Development of fruit rolls from banana. Presented at the International congress on *Musa.* Harnessing research to improve livelihoods.

セネガル

MINISTRY OF AGRICULTURE,
RURAL HYDRAULICS AND FOOD SECURITY
-------*------
Water Resources Management and Planning Department

DGPRE

Under the cooperation with
Huai Hong Khrai Royal Development Study Center, Thailand

Mobilization of Water Resources for Agriculture Sangalkam Rural Community (MWRA)

STRATEGIC DEVELOPMENT PLAN

Asia-Africa Knowledge Co-Creation Program
-Rural Community Development Sub-Program-
JFY 2006

THE GOVERNMENT OF JAPAN
JAPAN INTERNATIONAL COOPERATION AGENCY

JAPAN
Official Development Assistance

JICA

Contents of the Project Document

1 Introduction

In the setting of the program titled" Asia-Africa Knowlegde Co - Creation Program (AAKCP) "insider by the Japan International Cooperation Agency (JICA), Senegal was able to benefited of the Thai experience through the Huai Hong Khrai Royal Development Study Center.

The main objective was to establish a program permitting to install mechanisms encouraging the sharing of the knowledge and different experiences acquired between Asia and Africa in order to lead actions adapted to the context of the some and of the other. These mechanisms will permit to facilitate for every concerned country, the formulation of development strategies that is in conformity with its realities.

In the setting of the AAKCP program, Senegal made validate at the time of the seminary organized during the period of the 22 to July 28, 2005 in collaboration its Asians partners, a document of project title" **mobilization of water resources for agriculture in Sangalkam Rural Community** " of that takes into account the budget put in place.

Since the Rio conference in 1992, Senegal entered into a dynamics of integrated water resources management. This process requires an implication of all actors to succeed to concrete and sustained results.

Water Resources Management Department (DGPRE) which has made of it its mission is elaborating an action Plan for Integrated Water Resources Management (PAGIRE).

Moreover, during last twenty years, the government of Senegal, with the support of the bilateral co-operation, has supported the development of agricultural sector and the efficiency of its organizations. Interesting results have been obtained. However, they have needed to be consolidated.
The under sector of horticulture constitutes a valid alternative today for increasing incomes of farmers in arid zones; therefore it tends to develop everywhere water is available.

2 Background

2.1 Socio-economic Context of the Country

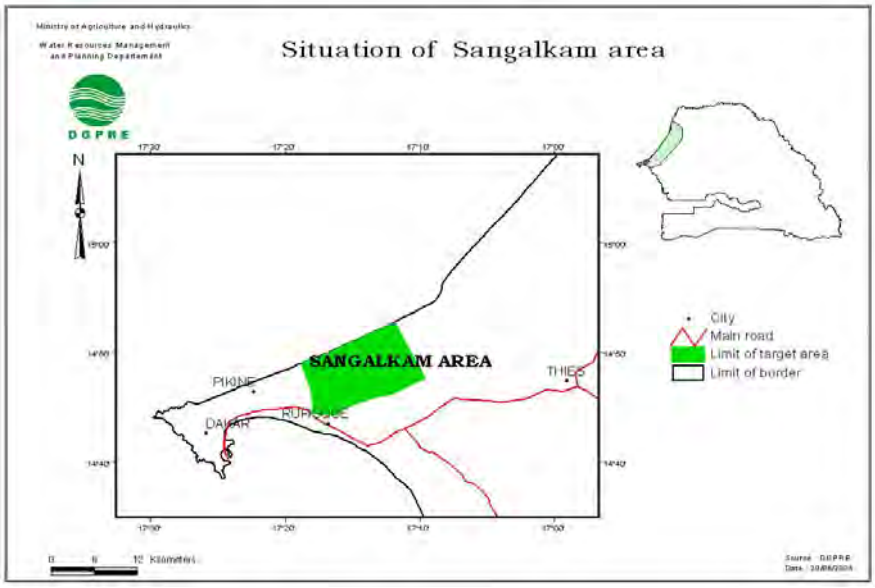
Sangalkam rural community is situated in the region of Dakar to the west of Senegal. It covers a surface of 195 square kilometers with a population estimated to 50,000 inhabitants distributed on 28 villages.
It is included into a vital zone in terms of developing horticulture. The economic function of this zone has another dimension, which is to contribute of the improvement of the social and nutritional status of the vulnerable population. Activities of market gardening make live many people and families.
Sangalkam area presents enormous potentials concerning agriculture:

- ✓ the climate is favorable to a lot of type of cultures;
- ✓ the existence of setting of dialogue (UNMP, URAS, FRAS...);
- ✓ the progressive introduction of agricultural techniques modern (system of irrigation drips to drop, choice varietals, manufacture and use of biopesticides, use of stamps...) ;
- ✓ the existence of conditioning centers of fruits and vegetables ;
- ✓ the proximity with the metropolis (markets, airport);
- ✓ the existence of mutual of saving and credit.

Unit market exploitations can be classified in two groups:

- ✓ small producers: who have parcels lower to 2 hectares, situated in sandy zones where the watertable is lower than 10 meters. The exploitation of water is essentially manual into traditional wells;
- ✓ big producers: who have modern exploitations with of surface from extent a lot more (2 to 50 hectares), exploiting hydraulic wells, the boring or the network of the Water Society (S.D.E).

All along the coast, a protected zone of trees is created to fight against the wind erosion.
The set of features (relief, permeability) does not permit the formation of a functional hydrographic network. A weak dripping in raining season nourishes sandy depressions sometimes.
The area is an important groundwater reservoir that provided water for the population and. the agriculture
One observes the emergence of local small industry of transformation of horticultural products (dried tomato or in paste) which develop the production more and more.



2.2 National Policies and Strategies

The outline of Senegal of the water policy was announced in various reports presented by the Ministry in charge of Hydraulics since 1977.
These principles were realized by a series of programs and projects aiming in particular:

- ✓ the improvement of people living conditions while allowing them to access to satisfactory of drinking water services and adequate sanitation;
- ✓ the fulfillment of requirements out of water for the livestock and the agricultural production;
- ✓ a better management and an adequate protection of water resources;
- ✓ the setting up of an efficient policy aiming the sustainability of the service.

These actions are within the definite macroeconomic framework through the ninth Plan of Strategic Orientations for the Economic and Social Development (1996-2001) of Senegal. To go in this direction, Senegalese authorities made the urgent option to fight for the complete control of water. This dynamic constitutes the base and the framework of the water policy in Senegal.

2.3 Institutions

In the dialogue framework between organizations of producers and the reinforcement of their position in the political dialogue for the management of the market gardening, fruit bearing and forest, the Association of the Market-gardening of the zone finished emerging and starts its phase of consolidation. It takes an increasingly significant part to tables of dialogue relating to the promotion of the market. The association has 16 unions' members for 10,000 producers of where more than 50% are women.

2.3.1 Laws and legal dispositions in water domain

- Law n°81-13 of March 4, 1981 related of Water Code;
- Decree n°98-555 of 25 June 1998 related to application of provisions of the Water Code relating to authorizations of construction and using equipment of collecting and discharging water;
- Decree n°98-556 of 25 June 1998 related to application of provisions of the Water Code relating to the Water Policy;

2.3.2 Competences transferred to communes

The commune is in charge of the protection of groundwater resources and surface water (article 29, Law n° 96-07 of March 22, 1996).

2.3.3 Competences transferred to rural communities

Rural communities are qualified for the creation and the maintenance of artificial ponds and reserves collinear for agriculture (article 30, Law n° 97-07 of March 22, 1996).

2.3.4 Methods used to exercise of water management by local communities

Conditions of discharging to effluents are fixed by an authorization delivered by the Mayor after opinion of the town council (article 35, Decree n° 96-1134 of December 27, 1996).

The protection of water resources by the rural community Quarterly controls are regularly carried out by qualified services in zones of bathe to evaluate the degree of healthiness.
Results of these controls are made available of the President of the rural Council, which, in the event of noted pollution, can ask the representative of the State to take measures for purposes to prohibit the bathe in the contaminated zones (article 42, Decree n° 96-1134 of December 27, 1996).

2.4 Problems

Today, the potential of watertable suffers an over exploitation due to techniques from non-suitable irrigation and that appears by a progressive folding in depth. Indeed, in Sangalkam rural community the exploitation of the watertable, more and more mechanized thanks to the use of motor-pumps in the individual boring of big exploitations, reduced the volume of the resource whose refeed is tributary of raining conditions.

Moreover, the majority of production of Sangalkam area is non-durable products and sensitive to germs and infestation of various natures. The insufficiency even the absence of means of conservation, storage and conditioning to the range of the population constitutes in many cases, of constraints to the development of the production and especially of incomes of producers.
In economic part, one notes following problems in the zone:

- ✓ financial resources are limited for small producers (difficulty access to the credit);
- ✓ most inputs (seeds, manure, pesticides, material, etc.) are imported and their elevated costs limit their use by the small producers;
- ✓ most farmers are not owners of lands that they exploit, it limits or prevent all possibility of important investment;
- ✓ the market tariff of water used is very expensive;
- ✓ there are frequent understockings of water to the level of markets perimeters.

In environment part on can note:

- an important reduction of groundwater level;
- a intrusion of salt water in wells of farmers;
- an agricultural pollution by manures and pesticides ;

This tendency could in the long-term compromise the durability of the economic activity and the environment of this ecosystem.
In the domain of the dialogue and the management of resource water, the studies and the activities of follow-up permitted a better knowledge of the dynamics of the resource.

Water remains the main factor that makes uncertain the results waited in spite of the considerable effort achieved lately in the domain of the credit and the organization of the agricultural sector in the zone.

2.5 Causes of the Problems

An analysis of the irrigation in the market zones shows a predominance of traditional methods used by farmers.
It appeared than practically everywhere in this zone, as well in exploitations practicing a traditional irrigation that those practicing the aspersion, techniques of irrigation are adapted. Market gardeners seem to obey a strange rule: “More water, more harvest”.
The report is that doses brought in parcels pass from 4 to 6 times needs recommended by researches. There is an enormous waste of water and energy.
The watering is done daily, of systematic manner, without technical consideration. Farmer includes rarely the water management in the conduct of his irrigated perimeters:

- he doesn't consider water like a factor of production, but rather like an inexhaustible source;
- he is not aware that soil is a reservoir, with a given useful water retention capacity;
- inconveniences bound to excess of water (washing, pollution of shallow aquifers, asphyxia of plants, and apparition of illnesses cryptogrammic and mechanical accidents of plants), seem to be unknown to him, or do not make the object of a preoccupation;
- he doesn’t know more about water legislation.

The existing center has not necessary human resources to achieve its missions. Technical services are not implicated into training activities of the center. However, some work sessions are organized to share experiences between farmers.

3 Plan Design

3.1 Objectives

The objectives aim:

- ✓ to restore and to develop water resources in the zone;

- ✓ to improve the potentialities of rural community for a durable development of agriculture;
- ✓ to sit the strong bases of a tripartite cooperation between Senegal - Japan - Thailand for the communal development.

3.2 Outputs

- ✓ Resources water in the zone will be known well and will be used rationally;
- ✓ The knowledge of the local operators will be improved in the domain of the existing authorized texts and in terms of know-how;
- ✓ The knowledge of extension workers will be improved in the domain of the irrigation systems aiming the preservation of the quality of the resource;
- ✓ the associations farmers will be redynamisées;
- ✓ the technology used by the peasants will be improved;
- ✓ the development of agriculture in the zone will be oriented in the food self-sufficiency.

3.3 Strategic actions

3.3.1 Short term action

The actions identified in the zone of Sangalkam will require the involvement of the local authorities, the populations and the technical services concerned.
These actions sum up thus:

3.3.1.1 Cartography of the occupation of soils and exploitation of available resources

Objective: it is to arrange a card of occupation of soils.

Achievement: to study the occupation of soil and the available resources, it is necessary to have:

- ✓ of the cartographic data: satellite pictures, topographic cards,;
- ✓ of the complementary data : static level, depth,;
- ✓ of the socioeconomic data: villages, population, type of activity etc.

Methodology: to create a network of collection of data

3.3.1.2 works of planning of small reservoirs (sites)

Objective: it is to have resources of water in reserve while collecting the rainwater.
Works of planning will be done on some sites to improve their potentiality.
It is about:

- ✓ of the site of kagnack
- ✓ of the site of the farm of the Volunteers
- ✓ of the site of Diacksao
- ✓ of the site of Khaw (Tivaouane Peulh)

Achievement: These works concern the terracing of these sites and the supplementary works to make they usable during all year round.

Methodology: Basins of water will be created in the zone where the aquifer is shallow to encourage the capacity of retention.

3.3.1.3 Capacity Building of extension workers

Objective: it develop the leaders on the ideas of development

Achievement: to promote and to push the young to become an efficient technical staff through a knowledge and the necessary expertise for the development of an integrated agriculture stretching toward the farmer's autonomy.

Methodology: to establish a network of exchange with the community of Baan Paasak-ngam, Chiangmai, Thailand through the Royal Center of survey of Hooted Hong Khrai.
To send six (6) young to be going to form themselves at the center and in Baan Paasak-ngam.
The following domains are targeted:

- ✓ the mastery of water: implantation of small dams, systems of irrigation using less water...;
- ✓ the diversification of the generating activities of incomes: raising, pisciculture, development of medicinal and ornamental plants...;
- ✓ the fertilization of soils;

- ✓ reforestation;
- ✓ use without risk of the pesticides;
- ✓ the development of the wind energy to small scale;
- ✓ the development of the ecotourism.

For the women, the formation will be access on:

- ✓ the techniques of transformation of the products to least cost;
- ✓ the techniques of conservation.

3.3.1.4 backing of the existing center

3.3.1.4.1 development of the potential of farmers

Objective: to establish a center of training on the agricultural development, the conservation of the natural resources and the involvement to the development of an agriculture oriented toward the food self-sufficiency.

Achievement: to develop the personal potential while already using the examples successful. To develop appropriate agricultural models to resources in water, to the physical and social conditions of the zone to sustain the agriculturists.

Methodology:

- to promote and to push the development of an agriculture multi alternated;
- to plant the edible trees, for food and herbs,;
- To foresee the necessary matters and materials supporting the farmwork and of construction;
- to make sessions of formation and to plan some services for the sharing of knowledge and information.
- to encourage and to support the method to "learning by doing" the method aims youth and the farmers more;
- to organize the management of the centers while using the integration of the ideas;
- to spread the knowledge to the other communities through networks of working of farmers;

Existing polyvalent center

3.3.1.5 setting up of groups and creation of communal networks

Objective: to make participate the community in the process.

Achievement: to create a powerful community for the development of the process.

Methodology:

- to create processes of training, of exchange of experiences on the communal problems,;
- to promote and to push the groups working for the development;
- to create some procedures to follow, to verify and to value the communal involvement.

3.3.1.6 setting up of a data base to facilitate the sharing of information

Objective: to study and to follow the results on the ecological changes.

Achievement: to use the data like example of success to learn and to plan the expansion of the operational results.

Methodology:

- to prepare the necessary facilities
- to collect the data on the pluviometer, the temperature, the growth of the plantations, the humidity of soil, the exploited earths etc.
- classification of the data and analysis
- reports, use of the results,
- Exit of documents for information

3.3.1.7 establishment of a setting of cooperation for the development with the partners (Japan and Thailand)

Objective: to push the progress of the operations

Achievement: implication on the activities of project, demand of information or advice, tentative of resolution of problems and constraint during the operations etc.

Methodology:

- rallies, technical visits,;
- sharing of information and contribution of advice by correspondence or email;
- involvement to the assessment of the project at the end.

3.3.2 actions to middle and long term

Those actions will require other partners and will take about 6 years.
The targeted actions are:

3.3.2.1 identification of the hydrographic network existing in the zone

Objective: to revitalize the existing network

Achievement: to make a map of the hydrographic network of the zone.

Methodology: to make the streamlining of the hydrographic network identified thanks to a suitable planning.

3.3.2.2 Implementation of small dams" check dams" to strategic positions

Objective: to increase the capacity of soil retention

Achievement: to encourage the possible maximum the use of the rainwater

Methodology:

- to teach to the community to identify the strategic positions for the pose of the small dams;
- the follow-up of the out-flow of waters to specific points and the planning adapted to make according to the local material;
- to encourage the community to participate in the construction of the small dams" check dams ";

While taking into account the conditions of the zone as the speed of water or the length of the stream or the slope of the land, on average the community should be able to construct 40 small dams per year.


Small dams made with local material (bamboo)

3.3.2.3Regeneration of natural resources (forest, fauna, soils)

Objective: it is to restore the ecological natural system.

Methodology:
- to plant three (3) kinds of trees: trees for the goals of the utility, trees to goal fuels, trees to goal of food while using their leaves, the fruits, or shoots including herbs. These trees will be planted on water, regions of the pan, community public spaces and conservation regions.
- Trees as breeze wind in the agricultural regions around their beds while using some trees to fast growth;
- to develop the plants nurseries that will serve that will be for the reforestation;
- to put on foot of the protective devices of the trees against some curses as the forest fire, the weeding etc.,

4 inputs

4.1 Senegalese side

It will be necessary to establish a Team of project who will be composed of:

- of the Council Rural: 3 representatives
- the Executive Local of Dialogue and organization Farmer (CLOP): 2 representatives
- Farming women of the precinct of Sangalkam (FRAS): 2 representatives
- Department Resources in Water: 2 representatives
- Department of the Farming Genius: 2 representatives
- Department Agriculture: 2 representatives
- Departments Analysis and Statistical Forecastings: 2 representatives
- Department of horticulture: 2 representatives

4.2 Thai side

The backing of capacity will be twisted by the Center of survey of Hooted Hong Khraï of Kingdom of Thailand with the involvement of the BaaPasak-ngnam community.

4.3 JICA side

JICA is solicited to finance the actions short-term.

Designation	Time frame	Items		Estimated cost
Training course in Thailand		Air Ticket (Dakar Thailand Dakar)	6 pers X...	
		Perdiem	4 pers X ...X30 days	
		Perdiem	2 persX....X 10 days	
Cartography of the occupation of soils and exploitation of available resources		Acquirement and treatment of data		
Works of improvement of sites		Clearance Annex Building		
Equipment for centre		Computers	2	
		Digital camera	1	
Setting up of a documentary database		Collect data Development of database	Missions into technical services	

4.4 Important Assumptions

Legislative elections will be organized on February 2007. As it concerns local authorities, that may cause some perturbations to the planning of activities. Local associations of farmers also accept to cooperate and the rainfall remains constant.

4.5 Project Implementation Structures

4.5.1 Implementation Structure

The team of project will be composed by:

- ✓ Rural Council: 3 representatives
- ✓ Water Resources Department: 3 representatives, the Director and two (2) collaborators;
- ✓ Rural Engineering Department: 2 representatives
- ✓ Agriculture Department: 1 representative
- ✓ Horticulture Department: 1 representative
- ✓ Association of the Market-gardening of the zone: 2 representatives
- ✓ COCOGEN: 2 representatives

4.5.1.1 African Implementing Organization(s)

Water Resource Department has the role:

- ✓ to coordinate all activities of the project such as work session, technical meetings
- ✓ to establish the topographic map of the area (soil occupation, land use...)
- ✓ to do the monitoring of groundwater quantity and quality in this area
- ✓ to assure the secretary of the project

Rural Engineering Department:

- ✓ Technical Choice of and planning of sites
- ✓ Control of activities

Agriculture Department has the role:

- ✓ to define the agricultural policy in the target area
- ✓ to coordinate all agriculture projects in the area

Horticulture Department has the role:

- ✓ to propose irrigation systems will provide to manage water resources
- ✓ to propose types of vegetables will be promote to increase farmers incomes

COCOGEN can assure the sustainability of the project:
- by helping and controlling extensions workers;
- by organizing some awareness workshop

4.6 Impacts

The impacts will appear on several domains:

- the community will be strong and will be able to assure his/her/its own development grace a regionalist economy;
- the ecological systems of the community are restored with an awareness of the stakes;
- resources in water of the community are developed for its needs without affecting the environment, but appropriate for the models of agriculture multi - alternate.
- the communities learn to develop their knowledge and to preserve the natural resources and the environment;
- The setting of communal cooperation between Senegal / Japan/Thailand will be reinforced.

4.7 Durability

4.7.1 conditions to assure the durability

The Committee of Dialogue on the Management of water in the zone of the Niayeses (C.O.C.O.G.E.N) is a consultative organ that has for mission:
1. to coordinate the implementation of the Plan of action for the management integrated of resources in water in the zone of the Niayeses;
2. to study and to analyze, while holding account of the demand of the administration of the local collectivities or users, all relative questions to the management of water in the zone of the Niayeses.

His/her/its questions concern:
"the scheduling for the development and the preservation of resources in water of the zone of the Niayeses;
"the coherent and rational enhancement of resources in water of the zone of the Niayeses;
"the relative regulation to the exploitation, the sale, the distribution, the protection of resources in water of the zone of the Niayeses and to the agricultural hydro amenities in the geographical circumscription of the zone of the Niayeses;
"All other aspect bound to the management and the mastery of resources in water.

C.O.C.O.G.E.N can assures the durability of the project:
- while studying the expansion of the results of the project in the zone of the Niayeses
- while pushing and while controlling the activities;
- while organizing shops of sensitization and information.

4.7.2 Further Development

After the elaboration of the strategic plan, the rural Council of Sangalkam will contact other partners to implement a controlled development of the ecotourism
The ecotourism permits to promote local products, but it is necessary to prepare the populations and to fix the rules of management. Communities must work with the Ministry in charge of the Tourism to manage the ecotourism together and to create a setting of dialogue between them.

5 Monitoring and Evaluation

5.1 Monitoring

Water Resource Management and Planning Department (DGPRE) will assure the monitoring of groundwater each 3 months by collecting level of water and some chemical parameters like conductivity...
The center will ensure the role of awareness to expand new technical methods.
Agriculture Department will follow the production of crop in this area.
A report will be written by both Departments showing the evolution of the situation of groundwater and agricultural products.
A copy will be send to Asian partners to follow results.

5.2 Evaluation

The evaluation plan shall be execute by population and technical services

Activities	Indicators	Methods	Responsible
Monitoring water quantity and quality in this area	Water level, salinity of water	Technical visits	Water Resource Department
Following evolution of agricultural product in this area	Among of product	Local statistics	Agriculture Department
Equipments for center	Technical functioning of center	Getting information	Rural Council and Personnel of center
Awareness of irrigation systems (drip by drop)	Number of farmers will be connected to systems	Local investigation	Horticulture Department
Exchange information	Number of farmers touched	Workshops	Humans Resources of Center
Setting up a database	Among of Data collected	Technical visits	Water Resources, Agriculture Department

Annex: Synthetic table of strategic actions

Period	Objective	Outputs	Actions	Global Calendar	Responsible	Other actors	Indicators	Target Group	Necessary Resources
Short term (3 years)	to set up a center which will have the capacity to relieve information between local actors to share their know-how in Sangalkam rural community notably by integrating aspects bound to water resources management and planning	Digital map is made	Cartography of the occupation of soils and exploitation of available resources	4 months	Water Resources Department	Rural Engineering Department	Cartographic data base of the zone	Population	Logistics, Human and Financial,
		Four sites are planned	Works of planning of the sites	6 months	Rural Engineering Department	Rural Council, Water Resources Department	Works achieved effectively	Framers	Techniques, Human and et Financial
		Farmers' knowledge is improved	Capacity Building of stakeholders	6 months	Rural Council, Pilot Centre	Water Resources Department	Better know-how knowledge of farmers	Population	Techniques, Human and Financial
		Center is very well organized and functioned	Reinforcement of the existing center so that it have necessary equipments to function	6moonths	Rural Council, Pilot Centre	Water Resources Department , Agriculture Department	Adequate Functional structure	Population	Material, Human Financial
		Functional Information system	Setting up of a documentary database	3 month	Rural Council, Pilot Centre	Water Resources Department, Agriculture Department	Functional database	Population	Material, Human Financial
		Reports are validated	Monitoring and assessment	3 months	Water Resources Department, Agriculture Department	JICA	Technical reports	Population	Techniques, Human
Mid, Long Term 10 years		River network is redefined	Revitalization of fossil valleys in the zone	4 years		Rural Engineering Department	Map of the hydrographical network is established	Population	Human and et Logistics

		Capacity of soil retention is increased	Implementation of small dams to strategic positions	6 years	Water Resources Department, Rural Engineering Department	Rural Council, Water Resources Department Population	Number of check dams built	Population	Material, Human Financial
		Forest and soils are regenerated	Regeneration of natural resources (forest, fauna, soils)	8 years	Forests Department, Agriculture Department	Rural Council Population	Number of animals and plants species generated	Population	Material, Human Logistics and Financial
		Incomes of population are improved	Development controlled of the ecotourism	10 years	Rural Council, Population	Forests Department	Number of sites identified and developed	Population	Techniques, Human and Financial

南アフリカ

SOUTH AFRICA

PROJECT PROPOSAL
for technical course on soil erosion and moisture retention.

Prepared by

Department of Agriculture, Limpopo Provincial Government, South Africa

and

Huai Hong Khrai Royal Development Study Center, Thailand

under

TECHNICAL COOPERATION BETWEEN SOUTH AFRICA, THAILAND AND JICA

ASIA-AFRICA KNOWLEDGE CO-CREATION PROGRAMME (AAKCP)

RURAL COMMUNITY DEVELOPMENT SUB-PROGRAMME (RCDS)

DEPARTMENT OF AGRICULTURE RSA LIMPOPO PROVINCE
PRIVATE BAG X 9487
POLOKWANE
0700

INTRODUCTION

The Provincial department of Agriculture implemented the Policy research project(PRP) in coordination with Japan Government, through Japan International cooperation Agency (JICA).The inter action and the implementation of the PRP involved expects from Haui Hong Khrai (HHK) Royal development center in Thailand, Provincial officials and Sekhukhune District.

The PRP was not only based on knowledge exchange but on co- creation of knowledge by the two partners, which are Thailand and RSA to suit the environmental situation. South Africa is one of the eight (8) countries participating in the Asia- Africa Knowledge co-creation program (AAKCP). The co-creation process was done through seminars, visits and workshops which unfolded as follows:

1 The first seminar was held in Japan from the 22nd to 16th April 2005.
2 The mid term seminar was held in Thailand from the 25th to 28th July 2005.
3 Field study Visit by Thai expects from HHK to Limpopo Province.
4 Field study visit by one official from the Province, one official from Sekhukhune District and one Community member from the selected pilot project.
5 Workshop and hands on training at Ga- Maila Mapitsane pilot project.
6 Final seminar held in Kenya from the 26th to 30th June 2006 for evaluation.

Activities and observations during the inter action of Partners (Thailand and RSA)include the following:

Activity	Lesson Learned
• Visited HHK projects	• Different methods of conserving Water and soil formation using natural resources. • Closer cooperation between the center and the communities in soil and soil and moisture management. • Mushroom growing as an income generating enterprise.
Visited communities in Thailand and overnight at the village to exchange ideas.	• Impact of cultural norm and values on responsible use of natural resources • Differences between RSA and Thailand on soil structure rainfall and Land tenure system • Youth training on different developmental activities while keeping natural resources in perfect balance.
Visited Land development office and its projects.	• Different technologies used in highlands on soil and water management

Workshop on importance of care of natural resource.	• Better understanding of basic natural resources (water moisture and soil). • How to use natural resources responsibly. • Maintenance of moisture and vegetation.
Hands on demonstration at the pilot project.	• Construction of check dams using local available natural resources. • Check dams retain water, prevent soil erosion and encourage forestation.

Achievements

1 The PRP in RSA served as an awareness in terms of effective soil and water care
2 The land care committee has been strengthened and capacitated in an additional method of soil and water care using available natural resources.
3 The idea of planting useful forest like herbs, food, and plants to be used as materials in future has been created.
4 Community members acquired team spirit and self reliance.
5 The effectiveness of the check dams has been observed at the pilot project.
6 After Thai expects left the communities continued with the construction of check dams in coordination with land care component.

PROPOSAL

Problem;

Sekhukhune district is nodal area with high rate of poverty and unemployment and depend mostly on Agricultural activities. Soil erosion increase the level of poverty since the land and water are the basis in Agricultural production. The problem of soil erosion result in unavailability of enough land for Agricultural production. Food security depends on the availability of good soil and water. Most of the land in Sekhukhune is bare and easily destroyed by wind and other agents.
The inter action between the two partners revealed that more time and continuity is required. The training could have been more effective if the period of the PRP was more than six (6) months.

Causes of soil erosion

- Overgrazing contribute in the degradation of the soil since very little land is used for grazing of a large number of livestock in most villages.
- High pressure of fire wood collection as a result of lack of access to electricity in most villages does contribute to soil erosion.
- Improper cultivation practices due to lack of technology and skills destroy the soil structure and soil fertility.

Field fire also course soil erosion as the vegetation is been destroyed living the soil bare and venerable to wind.

*The proposed PRP may not be able to address all the causes, and the targeted cause is Poor land and water management in most villages resulting in dam siltation and loss of moisture.

Project purpose

- The main purpose of the training project is to train extension officer and community representatives on construction of check dams using available natural resources in details.
- The targeted group will also be trained on utilization of different local materials.
- The co-creation will also focus on effectiveness of check dams on soil erosion control and moisture retention.

Overall goal

During the first inter action with the community it was discovered that originally the land had vegetation and covered, but due to the courses mentioned the land remained bare with infertile soil. The overall goal of the exercise is to recover the environment closer to it original use full state.

Expected output.

Extension officers and community representative are trained on the co-created methods and are able to teach others.
The method is practiced in about 30% of Sekhukhune District
Evaluation of the exercise and its achievements be done by both partners(RSA-Thai)

Activities

- Training

The training will target Extension personnel in the identified three Municipalities, thus three extension officers per Municipality.(6)
Four community representative from six Villages. (24)
Two officials from the district office attached to Land care.(2)
Two official from Land care component in the Provincial office(2)
One official from Provincial Partnerships component.(1)

The total duration for the Proposed PRP is 6 months which may be subject to alterations. The process may be outlined as follows:

1 First (1)month Preparation and plenary with the involvement of local community leaders, in coordination with Asian Partners (HHK) development study center.
2 Second (2) month will be Thailand visit by two officers and two community representatives.
3 Third (3) month will be teaching and hands training of extension officers and community representatives by the team which would have visited Thailand under the supervision of HHK development study center expects.
4 Fourth (4) month will be dissemination of co-created knowledge to other villages through workshops, meetings and hands on demonstrations.
5 Fifth (5) month will be evaluation of the impact by both RSA and Thailand officials and allowing other Districts to come and observe.

6 Sixth (6) month will be the compilation of the final report, recommendations, future plans and dissemination of the co-created method to other non participating villages which will be referred to the pilot project for further training.

- Dissemination of the adapted method

Community meetings will be held at various participating villages and trained community representatives will present the objectives and importance of the exercise, with the assistance of the officer.

After training community representatives and officer of the areas will have to practice what they learned with the supervision of the Thai expects.

Teach other members of their communities and also do some hands on training to others.

Communities will also be allowed to visit the pilot project to observe the impact

- Evaluation

The evaluation process will be done by both partner trough meetings and by the use of indicators.

Evaluation will be done when the project is halfway during the implementation and upon completion of the project.

Each partner will do its evaluation and send to partner country as well as to head office.

Inputs

African side
Project manager
Extension officers
Other Government Departments
CBO
NGO
Local budget

Relevance

The plan is relevant due to the following reason

1 The community depends on agriculture and there fore need land with good soil.
2 The construction of check dams has three benefit in one thus, it prevent soil erosion, serves as water source and retains moisture for the vegetation.
3 More cooperation is needed with Thai since the material they use is not available in RSA we need to co-create on the available natural resources on how best to use it for effective soil erosion prevention.
4 The previous cooperation was very short and some of the things were learnt theoretically, and more time is needed for more practical co-creation and identifying other alternative natural resources which may be used.

Sustainability

The sustainability of check dam method is based on strength of rocks, following the correct packing as demonstrated, the properly packed rocks does not restrict water to flow but it reduces the speed and allow the flow to be gently while depositing some use full soils.

The methodology will be incorporated in the Land care program by involving Land care component in the whole process of the proposed PRP.

The method will be disseminated easily even after the PRP through the Land care Program.

タンザニア

UNITED REPUBLIC OF TANZANIA

MINISTRY OF COMMUNITY DEVELOPMENT, GENDER AND CHILDREN

DRAFT GUIDELINES FOR DISTRICT TEAM TO DEVELOP PLAN FOR

HIV/AIDS PREVENTION

Prepared under the cooperation with Ministry of Public Health, Thailand

DAR ES SALAAM
AUGUST, 2006

Guidelines for District Team
to
Develop Plan for HIV/AIDS Prevention

Vol. 1:

- Health promotion for specific population groups: youth, women, girls and men
- Condom use
- STI control and case management

List of contents

Guidelines for District Team to Develop Plan for HIV/AIDS Prevention

1. Background and purpose of the guidelines

HIV/AIDS epidemic is one of the most prevalent infectious diseases that affect human beings. The HIV virus is mainly transmitted through sexual intercourse with an HIV infected person, blood transfusion with infected blood and from HIV infected mother to her child.

Tanzania is among the countries with the highest HIV prevalence in the world and the infection rate has been increasing rapidly. According to the Tanzania HIV/AIDS Indicator Survey (2003-2004), 7% of Tanzania adults aged between 15-49 years was infected with HIV/AIDS. Prevalence among women was higher (8%) compared to men (6%). The HIV prevalence rate in Morogoro is 6.7%

The purpose of this guideline is to assist all sectors involved in the prevention of the spread of HIV virus at a district level, including extension staff, local leaders, non-governmental organization, community based organization and faith based organization, to formulate relevant interventions specific to local situation.

This guideline has been developed based on the National Multi-Sectoral Strategic Framework on HIV/AIDS (2003-2007): NMSF, National Policy on HIV/AIDS and baseline survey on HIV/AIDS done in Mvomero and Morogoro rural district in 2006.

The main focus is on the following strategic areas:

- Health promotion for specific population groups: youth, women, girls and men
- Condom use
- STI control and case management

The guideline will serve as a tool to study the NMSF, assess the local HIV/AIDS situation and responses, and provide methodology on how to develop district plan for HIV/AIDS prevention.

2. How to develop district plans for HIV/AIDS prevention

As the NMSF translates the National Policy of HIV/AIDS by providing strategic guidance to the planning of programmes, projects and interventions by various stakeholders in the fight against HIV/AIDS, district HIV/AIDS plans can be developed by utilizing the NMSF as the framework to design interventions specific to the local situation. Thus, the assessment of HIV/AIDS situation as well as responses in the district is certainly needed for planning district HIV/AIDS plans.

The following steps describe how to develop district HIV/AIDS plans by using the study in Mvomero and Morogoro rural district as the example.

2.1 Study the National Multi-Sectoral Strategic Framework on HIV/AIDS (2003-2007): NMSF

The study of the NMSF aims to identify

- strategic areas of responses needed for district HIV/AIDS plan development,
- cross cutting issues relevant to the district HIV/AIDS plan,
- strategies relevant to the district HIV/AIDS plan

The study can be done stepwise as follows:

a. Select related goals

The goals relating to HIV/AIDS prevention include Goal #1, which refers to overall impact, and Goals #6 and #7, which refers to prevention in STIs and HIV/AIDS education. The district situation has to be reviewed in order to select which areas the district plan should cover. The indicators and targets set in the NMSF can be used as the reference target to define the priority of the district situation. The following table was designed to compare the district situation with the national targets.

Goal	Indicator	National Target		District situation	
		Year	Value	Year	Value
#1 (Overall impact) Reduce the spread of HIV in the country	• Percentage of young people aged 15-24 years who are HIV infected	2007	30%		
# 6 (Prevention) Reduce the prevalence of STIs in the population	• Percentage of patients with STI at health care facilities who are appropriately diagnosed, treated an counseled (80% of health care facilities)	2007	70%		
# 7 (Prevention) Increase the knowledge of HIV transmission in the population	• Percentage of young people aged 15-24 years who both correctly identify ways of preventing the sexual transmission of HIV and who reject major misconceptions about HIV transmission • Percentage of young men and women aged 15-24 years have access to Information Education including peer education and youth specific	2007 2007	95% 95%		

	education				

If the district does not have concrete data to compare with the national targets, the district team can use the focus groups among stakeholders to identify which Goal should be considered for planning. However, establishing database system in order to monitor the HIV/AIDS situation and responses should be considered for long term plans.

b. Select strategic areas

Strategic areas have to be reviewed and identified for district planning. Strategic Goals, indicators and national targets relating prevention are as follows.

Strategic Areas of the National Response
Goal # 6, 7 (Prevention)

1. STI control and case management
2. Condom promotion and distribution
3. Voluntary HIV counseling and testing
4. Prevention of Mother to Child Transmission (PMCT)
5. Health promotion for specific population groups: children & youth, women and girls, men, disabled people
6. School-based prevention for primary and secondary level
7. Vulnerable population groups: commercial sex workers, men who have sex with men, bar maids, prisoners, policemen and soldiers, mobile populations, refugees, and drug users
8. Workplace interventions (public, private and the informal sectors)
9. Safety of blood, blood products and universal precautions in health care and non-health care settings including hospital waste management

These guidelines will focus on the Strategic areas No. 1, 2 and 5 which are STI control and case management, condom promotion and distribution, and health promotion for specific population groups: children & youth, women, girls and men.

c. Review thematic areas

The study on the relating thematic areas will assist the team to have alternatives for the plan development. Rationale, expected outcomes are summarized together with considerations as strategies for interventions development in the following tables.

Thematic Area	Rationale	Expected Outcomes	Considerations for the district HIV/AIDS plan
Thematic Area 1: Cross-cutting issues relating to entire response			
1. Advocacy	• Continuous strong advocacy can reduce the social and cultural barriers in the fight against HIV/AIDS.	• HIV/AIDS remains a priority issue of which general public as well as decision makers take for granted to participate in fighting with.	• Develop communication plan for specific population through participatory approaches in using local situation in terms of HIV/AIDS situation, trends, risks and vulnerability as well as socio-economic impact as inputs for developing messages. • Include networks and individuals of Persons living with HIV/AIDS (PLWHA) to take part in advocacy work.
2. Fighting Stigma and Discrimination	• Stigma of HIV/AIDS as a sexually transmitted disease and discrimination of PLWHA prevent open and informed discussion of issues related to sexuality, which contributes to denial and irresponsibility by the population at large.	• HIV/AIDS and related issues accepted and dealt with more understanding and tolerance in society.	• Promote greater involvement of PLWHA and their networks in HIV/AIDS interventions and public promotion by local political leaders. • Strengthen VCT facilities in reducing stigma and discrimination.

Thematic Area	Rationale	Expected Outcomes	Considerations for the district HIV/AIDS plan
3. District and community responses	• Effective responses to the epidemic are based on the capacities of people living in the communities to assess their own vulnerability and plan their own responses. It is in the communities and at local level where the fight against HIV/AIDS will be decided.	• Districts and municipalities are developing and implementing their own comprehensive plans and contribute to the sustainability of the HIV/AIDS related programmes.	• Promote and improve the coordination of various actors, including government, non government and civil society, under the 'anchor' of the local government councils. • Mobilize local financial resources to sustain activities. • Identify and address the needs for capacity building of the various actors in districts, municipalities and communities.

Thematic Area	Rationale	Expected Outcomes	Considerations for the district HIV/AIDS plan
Thematic Area 2: Prevention including Gender			
1. STI Control and case management	• STI control and prevention has been proven to be one of the major promising strategies in reducing HIV transmission.	• Patients with STIs are appropriately diagnosed, treated and counselled.	• Make quality STI services including counseling, behavioural change communication and condom promotion available to general population and specific vulnerable groups like Commercial Sex Workers, Military and Miners. • Involve the private medical sector (hospitals, practitioners, pharmacists) in training and quality control.
2. Condom promotion and distribution	• Male condoms are one of the most effective and easy to use for preventing the sexual transmission of HIV, but their general acceptance and regular use is still very limited.	• Young people aged 15-24 years consistently use condoms with non-regular sexual partners.	• Provide the knowledge of correct and consistent condom use as the way to protect HIV transmission, considering gender and other socio-cultural barriers to using condoms. • Expand the availability and accessibility of quality condoms and strengthen the involvement of the private sector in condom distribution.

Thematic Area	Rationale	Expected Outcomes	Considerations for the district HIV/AIDS plan
			• Develop participatory Monitoring and Accounting systems.
3. Health promotion for specific population groups: children & youth, women, girls and men.	• Segments of society need to be addressed with specific approaches. It is evident that the needs of youth, women, men and their respective contribution to the fight against the epidemic are quite distinct based on their economic, social and cultural situation.	• Different section of the population are competent to deal with the challenges of HIV/AIDS by delaying onset of sexual activities, reducing the number of sexual partners and/or adopting safer sex measures as well as increasing understanding of gender issues.	• Increase accessibility of specific groups of population to friendly services for Reproductive Health, STI and VCT. • Develop interventions against drugs and sub-stance abuse, especially excessive alcohol consumption. • Develop comprehensive HIV/AIDS interventions for primary, secondary and tertiary education. • Empower girls and women to protect themselves as well as promote male responsible behaviour in sexual and family relations. • Promote open discussion about gender and culture related traditions and sexual behaviour that increase vulnerability of women/girls to HIV/AIDS.

2.2 Assess the local HIV/AIDS situation and responses

The local HIV/AIDS situation and responses should be assessed in order to articulate the NMSF to be specific for the local situation. The framework for assessment can be developed using the relating goals' indicators and expected outcomes of selected strategic areas outlined in the following table.

Goals / Strategic Areas	Indicators/Expected Outcomes	Possible Sources/Means of data collection in districts
Goal #1 (Overall impact) Reduce the spread of HIV	• Percentage of young people aged 15-24 years who are HIV infected	• Patients registration (Annual sero-surveillance in 6 regions with 4 sires each in place to monitor this indicator at the national level.)
Goal # 6 (Prevention) Reduce the prevalence of STIs in the population	• Percentage of patients with STI at health care facilities who are appropriately diagnosed, treated an counseled (80% of health care facilities)	• Sampling survey from 80% of health care facilities in the district • Review the medical records
Goal # 7 (Prevention) Increase the knowledge of HIV transmission in the population	• Percentage of young people aged 15-24 years who both correctly identify ways of preventing the sexual transmission of HIV and who reject major misconceptions about HIV transmission • Percentage of young men and women aged 15-24 years have access to Information Education including peer education and youth specific education	• Sampling survey • Focus group discussion can be considered to get qualitative data (Annual behavioural surveillance monitoring in 6 regions with 4 sires each in place to monitor this indicator at the national level.)
Advocacy	• HIV/AIDS remains a priority issue of which general public as well as decision makers take for granted to participate in fighting with	• Review the annual district budget documents regarding the availability of local funds for HIV/AIDS prevention programs/projects

Goals / Strategic Areas	Indicators/Expected Outcomes	Possible Sources/Means of data collection in districts
Fighting stigma and discrimination	• HIV/AIDS and related issues accepted and dealt with more understanding and tolerance in society.	• Review the annual district HIV/AIDS plan regarding the events and projects / interventions which address stigma and discrimination • In depth interview PLWHA and families as well as communities
District and community responses	• Districts and municipalities are developing and implementing their own comprehensive plans and contribute to the sustainability of the HIV/AIDS related programmes.	• Review the annual district HIV/AIDS plan and the annual report
STI control and case management	• Patients with STIs are appropriately diagnosed, treated and counselled.	See Goal #6 (above)
Condom promotion and distribution	• Young people aged 15-24 years consistently use condoms with non-regular sexual partners.	• Sampling survey • Focus group discussion can be considered to get qualitative data (It can be added in the annual behavioural surveillance monitoring in 6 regions with 4 sires each in place to monitor this indicator at the national level.)
Health promotion for specific population groups: children & youth, women, girls and men.	• Percentage of young people aged 15-24 years who both correctly identify ways of preventing the sexual transmission of HIV and who reject major misconceptions about HIV transmission	See Goal # 7 (above)

The selected indicators and expected outcomes stated in the NMSF provide issues as a scope of assessment relating to health promotion for specific population groups: youth, women, girls and men, condom use and STI control and case management. However, in order to understand the local situation and context enough to design intervention appropriate to the area; more data is needed, whether from the existing service recording system or new surveys, comprising both quantitative and qualitative data.

Steps of survey planned are described as follows by using the survey conducted under the Policy Research Project in Mvomero and Morogoro Rural districts, of which the results are used to demonstrate how the district HIV/AIDS plan can be developed in this guideline, as the example of how the district team assessed the local situation.

a. Define main and specific objectives

The main objective of the study in Mvomero and Morogoro Rural districts was to determine factors leading to unsafe sexual behaviours among the sexually active age groups. The specific objectives of the PRP were:-

- *To determine knowledge of people on HIV/AIDS*
- *To determine reasons as to why people entertain having multiple sex partners*
- *To explore on cultural practices and beliefs that favour unsafe sexual behaviours*
- *To determine factors leading to improper/lack of condom use*
- *To determine the extent of the Sexually Transmitted Infections (STIs) in the study area*

Specific objectives of the survey can be identified through reviews of existing data, previous studies as well as focus group discussion among local people. Issues to be explored in different areas may be different. The main purpose is to have more data specific to the district for designing the interventions.

b. Define study population, methodology and sampling

The case study in Mvomero and Morogoro Rural districts used a cross-sectional survey, which was conducted in three villages randomly selected from each district. In each village at least 50 respondents were randomly selected and subjected to a semi-structured administered questionnaire. In total 301 respondents, among which 147 were males and 154 were females, were interviewed. Their distribution by sex and district are as shown in the following table.

Study areas and Sample size randomly selected in Mvomero and Morogoro Rural district

District	Location	Study area	Sex of respondents		Total
			Male	Female	
Mvomero	Rural	Melela	23	27	50
		Manza	29	21	50
	Semi-urban	Changarawe	36	14	50
Morogoro	Rural	Fulwe	21	29	50
		Kiroka	25	25	50
	Semi-urban	Mkambarani	13	38	51
Total			**147**	**154**	**301**

Sampling methodology and sample size have to be seriously designed in order to represent study population. Number of sample size in the case study shown in the table above can be interpreted, based on the assumption that characters of population in the study area are quite homogeneous.

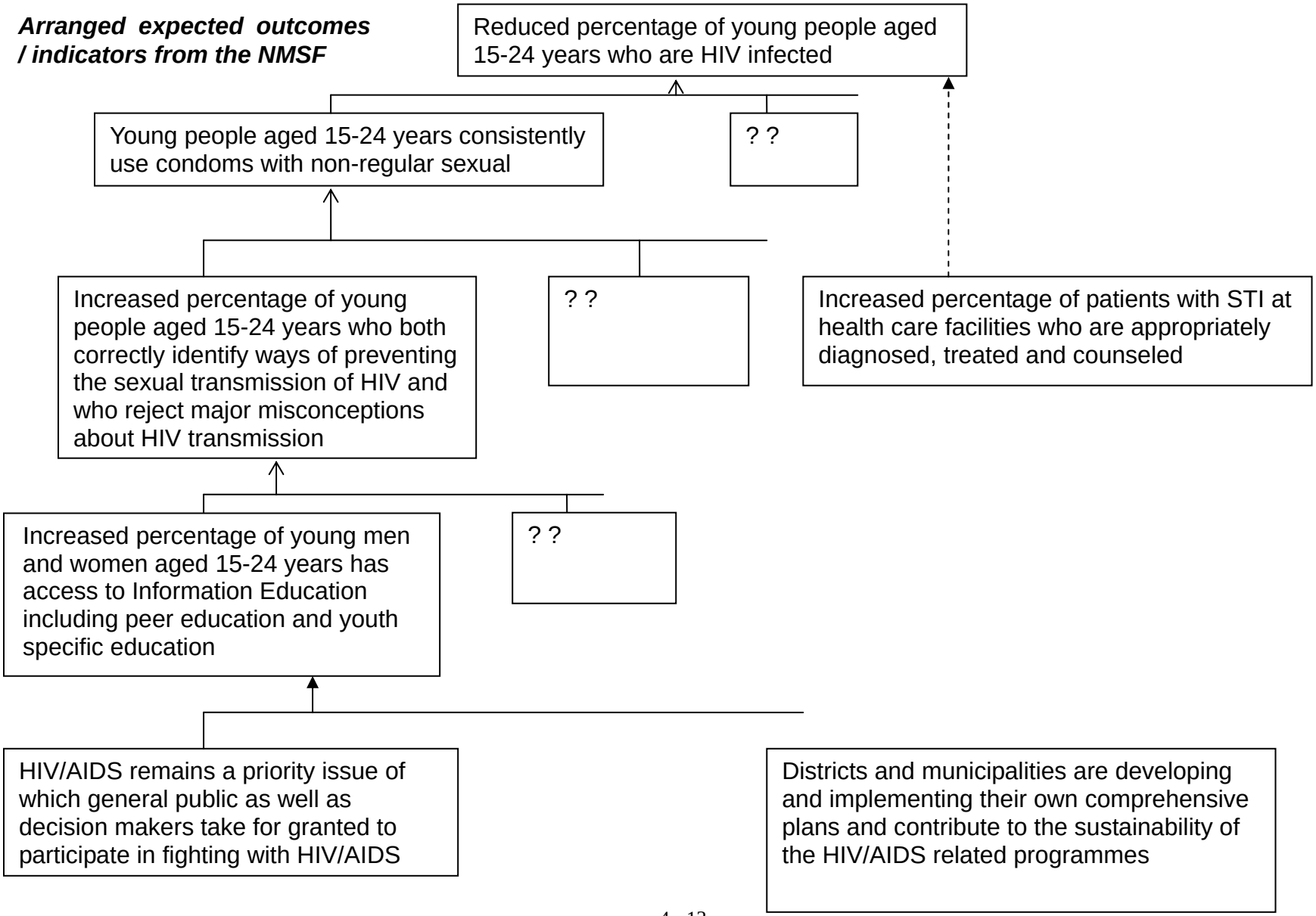
c. Data collection, processing, analysis and interpretation

District teams should work with academic people to design data collection tools, train interviewers, manage field work for data collection, process collected data, do analysis and interpret findings.

According to the framework of assessment in the above table, indicators / expected outcomes can be arranged in terms of means-ends as shown in the following figure. There are still many blocks to fill gaps of means-ends, which may be able to identify through focus group discussions among stake holders in the district.

The arranged indicators / expected outcomes can be used to preliminary design data framework, from which data collection tools can be formulated. Interviewers have to be trained; field work has to be planned. To analyze and interpret data, statistician and local teams working on AIDS have to work together in order to understand meanings of data.

Arranged expected outcomes / indicators from the NMSF



2.3 Develop the evidence based district HIV/AIDS plan

The overall impact of HIV/AIDS prevention aims at Goal #1, which is to reduce the spread of HIV. In order to achieve Goal # 1, the aims stated in Goal #6 and #7 can be considered as objectives of district HIV/AIDS plan, as followed:

Objectives:

1. To increase the knowledge of HIV transmission in the population
2. To reduce the prevalence of STIs in the population

This guideline will focus on the Strategic No. 1, 2 and 5 which are STI control and case management, condom promotion and distribution, and health promotion for specific population groups: children & youth, women, girls and men.

Implications of local assessment to the NMSF strategic areas

The results from the survey in Mvomero and Morogoro Rural Districts are used to demonstrate how the area specific interventions can be designed. The following part is only the example of how interventions are evidence-based planning.

Strategic area: Health promotion for specific population groups: children & youth, women, girls and men

Expected outcomes:

- Different section of the population are competent to deal with the challenges of HIV/AIDS by delaying onset of sexual activities, reducing the number of sexual partners and/or adopting safer sex measures as well as increasing understanding of gender issues.

Considerations for the district HIV/AIDS plan:

- Increase accessibility of specific groups of population to friendly services for Reproductive Health, STI and VCT.
- Develop interventions against drugs and sub-stance abuse, especially excessive alcohol consumption.
- Develop comprehensive HIV/AIDS interventions for primary, secondary and tertiary education.
- Empower girls and women to protect themselves as well as promote male responsible behaviour in sexual and family relations.
- Promote open discussion about gender and culture related traditions and sexual behaviour that increase vulnerability of women/girls to HIV/AIDS.

Findings from the study in Mvomero and Morogoro Rural districts

A. Knowledge about HIV/AIDS

1) High proportion of people had knowledge about HIV/AIDS but there are still certain proportion had misconceptions about HIV transmission:-
   - 24.7% had misconception that HIV transmitted by mosquito bites
   - 11.4% had misconception that HIV transmitted by shaking hands or eating with PHA
2) Some misunderstandings on how HIV/AIDS can be transmitted:-
   - Sharing clothes especially inner clothes/underpants
   - Biting insects such as mosquitoes, bed bugs, etc.

- Sharing cigarettes
- Shaking hands or touching a person infected with HIV

3) Some misunderstandings on how HIV/AIDS can be prevented:-
   - Getting tested
   - Pray God
   - To eat well/Good nutrition
   - To be treated whenever you get sexually transmitted diseases

B. Sexual partners

1) Mean age at which respondents got married were 25 years and 20 years among male and female respectively.
2) 15.6% of respondents were having more than 1 sex partner
   - 8.5% married and have >1 wife
   - 14.7% married and have lovers outside marriage
   - 11.1% not married and have >1 boy friend/girl friend
3) Reasons given by 37 out of 45 respondents, who have lovers outside marriage/cohabiting partners, were grouped as followed:-
   - Family sexual life
     - 34.3% have burning desire/socializing/relaxation
     - 17.1% lack of satisfaction/has another woman/spouse not settled
     - 8.6% whose wife has a young baby/sick/ in her menstrual period
   - Family conflict
     - 8.6% have misunderstanding between couples
   - Mobility
     - 7.1% separated by his/her spouse or when the spouse is away
   - Others
     - 2.9% failed to have children

C. Cultural practices and beliefs that favour unsafe sexual behaviours

- 25.6% of Moslems had multiple sexual partners compared to 13.9% of Christians. On the use of condoms there was no significant difference between the two religions. Majority of people in all religions did not always use condoms when having sexual intercourse.

<u>Conclusion</u>

1. There are still misconceptions regarding knowledge about HIV/AIDS
2. Lovers outside marriage might be a main reason leading to the transmission of HIV/AIDS `within families.

Proposed interventions specific to Mvomero and Morogoro Rural Districts

♦ HIV/AIDS Education

Despites quite high proportion of respondents have knowledge about AIDS, there are still misconceptions on both transmission routes and how to prevent getting transmission. The study results provide guidance of content which should be disseminated in the district.

Specific groups with misconceptions should be identified in order to plan channels to access them. The increase of accessibility of specific groups of population to friendly services for Reproductive Health, STI and VCT should also be considered.

Although the study has not been designed to assess the knowledge of students, misconceptions revealed from the study can be inputs for HIV/AIDS education in schools as well.

♦ Promotion of happy families

Major reasons given by respondents who have lovers outside marriage related to sexual and family relations. Thus activities to promote harmonized relations among couples are needed.

This can be targeted individually through existing services for Reproductive Health, STI and VCT. The empowerment of girls and women to protect themselves as well as promote male responsible behaviour in sexual and family relations should be considered.

Promote open discussion about gender and culture related traditions and sexual behaviour that increase vulnerability of women/girls to HIV/AIDS should also be considered.

Since this issue is very sensitive, service providers as well as community workers should be trained for this matter.

Strategic area: Condom promotion and distribution

Expected outcomes:

- Young people aged 15-24 years consistently use condoms with non-regular sexual partners.

Considerations for the district HIV/AIDS plan:

- Provide the knowledge of correct and consistent condom use as the way to protect HIV transmission, considering gender and other socio-cultural barriers to using condoms.
- Expand the availability and accessibility of quality condoms and strengthen the involvement of the private sector in condom distribution.

Findings from the study in Mvomero and Morogoro Rural districts

Condom use

1) Rates of condom use
   - Always use condoms: male: 24.6 %, female: 19.5 %

2) Rates of condom use at last sex with different partners
   - With spouse: 4.6% of male, 16.0% of female
   - With girl friend: 56.4% of male, 35.6% of female
   - With just met person: 30.0% of male
   - With sex worker: 0% of male (n=2)

3) Reasons given for not always using condoms (Male: 92, Female: 100)

	Male	*Female*
• Due to trust of their partners:	82.6	71.0
• Lack of partner co-operation:	2.2	12.2
• Negative attitude toward condom use:	1.1	4.0
• Lack of Knowledge:	2.2	1.0
• Unavailability of condoms:	6.5	1.0
• Related to birth control:	0.0	8.0

4) Availability, affordability and distribution of condoms
   - 87.1% admitted that condoms were available in their areas

General retail shop:	male: 58. 3%,	female: 45. 0%
Pharmacy shop:	male: 27. 1%,	female: 25. 0%
Health facilities:	male: 10. 4%,	female: 12. 5%

AMREF project / UMATI: male: 4. 2%, female: 7. 5%

- 14.3% males and 21.1% females said that condoms were obtained free of charge. 86.4% male and 78.2% of females who use condoms said that the prices of condoms were affordable.
- 25.2% male and 15.4% female felt convenient to purchase or ask for condoms in the presence of others.

5) Experiences and attitudes about condom use
   - Problems encountered when using condoms:-

Burst / torn / penis abrasion	52.7%
Rash / itching	21.1%
Unpleasant smell	5.3%
Reduced libido, strength	5.3%

   - Attitudes on the use of condoms:-

     Enjoy when using condoms (male: 53.3%%, female: 35.4%). The results show that more women (64.6%) did not enjoy sex compared to only 46.7% of males who did not enjoy sex when using condoms during sexual intercourse (P = 0.033).

Conclusion

1. Rates of condom use are still low. One of main reasons for not using condom is the trust the partners have to each other.
2. About half of both women and men did not enjoy sex with condoms.
3. Problems encountered when using condoms reflect needs of information about how to use condoms correctly.
4. Condoms are available and affordable. General retail shops are the mostly used place to purchase condoms. However, only 15.4% of female and 25.2% of male felt convenient to buy condoms in the presence of others.

Proposed interventions specific to Mvomero and Morogoro Rural Districts

♦ Condom promotion

Since the main reason for not using condoms is trust between partners, this need to be discouraged unless they are very faithful to each other, which is not the case in many instances. Therefore stickiness to one partner should be emphasized otherwise they should be emphasized to use condoms consistently.

Due to low rates of condom use in non regular partners and about half of both men and women did not enjoy when using condoms while some problems raised when using condoms, campaigns regarding safer sex with condom use as well as the knowledge of correct and consistent condom use as the way to protect HIV transmission, considering gender and other socio-cultural barriers to using condoms should be designed.

♦ Condom distribution

Even though condoms are available and affordable, strengthening the involvement of the private sector particularly general retail shops in condom distribution should be considered, especially how to make the buying process individually, such as using condom vending machines which people can put coins and get condoms from the machine.

Strategic area: STI control and case management

Expected outcomes:

- Patients with STIs are appropriately diagnosed, treated and counseled.

Considerations for the district HIV/AIDS plan:

- Make quality STI services including counseling, behavioural change communication and condom promotion available to general population and specific vulnerable groups like Commercial Sex Workers, Military and Miners.
- Involve the private medical sector (hospitals, practitioners, pharmacists) in training and quality control.

Findings from the study in Mvomero and Morogoro Rural districts

The extent of the STIs

- 18.9% have ever acquired STI in their life time, out of which 79.5% knew from whom they acquired the infection.
- 63.8% got treatment from health facilities.
- 27.7% of the total infected got treatment with their partners
- 8.6% bought medicines from shops and treated themselves.

Conclusion

1. The number of respondents who have got STIs is relatively small (18.9%). But however small, this indicates that there are still people who play sex without protection. Therefore condom use still needs to be emphasized.
2. Although majority of those with STI infection got treatment from health facilities, 8.6% bought medicines from shops and treated themselves.
3. Another thing which needs to be emphasized is the treatment of both partners. Only 27.7% got treatment with their partners. This may propagate transmission of STIs in the study area if not controlled.

Proposed interventions specific to Mvomero and Morogoro Rural Districts

- The sampling survey of quality of STI services provided by health facilities should be done in order to identify what should be improved, because 63.8% of STI patients had already got treatment from hospitals.
- The habit of treating themselves by buying medicines from shops without medical check up and getting proper prescriptions should be discouraged as this may lead to the development of resistant strains and hence drug resistance.
- Since a number of sample size was too small, it might not be able to find the information enough to identify specific vulnerable groups like Commercial Sex Workers, Military and Miners.

Cross-cutting issues relating to entire response

Although there is no information from the survey relating to the cross-cutting issues defined in the NMSF, the district planning team can still consider selecting the interventions appropriately to the local situation as proposed in the NMSF as followed:

♦ Advocacy

Expected outcomes:

- HIV/AIDS remains a priority issue of which general public as well as decision makers take for granted to participate in fighting with.

Considerations for the district HIV/AIDS plan:

- Develop communication plan for specific population through participatory approaches in using local situation in terms of HIV/AIDS situation, trends, risks and vulnerability as well as socio-economic impact as inputs for developing messages.
- Include networks and individuals of Persons living with HIV/AIDS (PLWHA) to take part in advocacy work.

♦ Fighting Stigma and Discrimination

Expected outcomes:

- HIV/AIDS and related issues accepted and dealt with more understanding and tolerance in society.

Considerations for the district HIV/AIDS plan:

- Promote greater involvement of PLWHA and their networks in HIV/AIDS interventions and public promotion by local political leaders.
- Strengthen VCT facilities in reducing stigma and discrimination.

♦ District and community responses

Expected outcomes:

- Districts and municipalities are developing and implementing their own comprehensive plans and contribute to the sustainability of the HIV/AIDS related programmes.

Considerations for the district HIV/AIDS plan:

- Promote and improve the coordination of various actors, including government, non government and civil society, under the ‘anchor’ of the local government councils.
- Mobilize local financial resources to sustain activities.
- Identify and address the needs for capacity building of the various actors in districts, municipalities and communities.