ネパール王国サルラヒ地区農村総合整備計画

プロジェクト　ファインディング調査

報　告　書

１９９２年２月

社団法人 海外農業開発コンサルタンツ協会

まえがき

ネパールの農業人口は全人口の約90％であり、その生産額はＧＮＰの約58％にあたる。ネパール王国は、農業国として、かつては穀物の輸出余力をもっていた。しかし、近年の年率推定 2.8％という大きな人口増加率に対して、主要穀物の生産性の増加率は依然として低く不作の年にはかなりの食糧が不足し、食糧危機対策を考えなければならないような状況になり、農業生産力の増強と穀物の流通手段の確保は、国家としての最大の課題となってきた。

ネパールの国土は、地理的には概して東西に長細い三条の地域帯から成り立っている。南部のインドと国境を接する低い平野地帯を Taraiと称し、中間は丘陵地帯で、古くからのネパールの中核的な地帯であり、その北は山岳地帯となっている。

Terai地帯はもともと密林地帯であったが、30年程前から開拓が行われ、急速に入植が進んで農業生産が増加した地帯である。今では Teraiは概して穀物の余剰生産地であり、丘陵地や山岳地帯は不足する地帯である。特に山岳地帯の食糧不足は深刻である。

このため、ネパール政府は、その第８次５ヵ年計画で、農業生産の増加、とくに主要農産物の生産については、各年増を目標にしており、このうち穀物生産，換金作物（サトウキビ，ジャガイモ，油料種子）を生産向上目標（産物）としている。人口地域較差の是正，食糧安定保障の見地から所得，食糧の均衡を推進する。

1．背　景

(1) 地　勢

ネパール王国は世界的に有名なヒマラヤを有する山岳地形に富む内陸国である。面積は約14万平方キロ、北緯26度20分から30度10分、東経80度15分から88度５分の間にまたがり、南北約 220km・東西約 880kmの横に細長い国である。

気候帯は南部に亜熱帯モンスーン気候、その北側の標高 200～ 700mの温帯性丘陵地帯、さらに北側に位置する寒帯性気候のヒマラヤ山岳地帯に分けられる。このように地理的には、東西に細長い三条のベルト条をなしている。南の低い地帯は Terai平野で、インドと国境を接している。中間の兵陵地帯は古くからネパールの中核的な地帯である。北は高山地帯となっている。

ネパールは国土を南北の境界線で５つのDevelopoment Region に分けている。これは交通が東西は山や川にはばまれて困難であるが、南北には比較的容易であることに起因している。５つのDevelopoment Region は14のZoneに分かれ、さらに合計75のDistrictに細分されている。

(2) 食糧生産と消費

全耕地面積は約 246万ヘクタールで、内訳は水稲63％・とうもろこし30％・小麦26％・その他９％である。平年作の穀物総生産量は、 260～ 280万トンで、このうち３分の２はネパールの穀倉地帯である Terai平野で生産される。したがって、 Terai平野は従来より食糧の余剰地域であった。一方、人口の３分の２を占める丘陵および山岳地域では　全穀物の３分の１しか生産できず、慢性的な食糧不足地域となっている。しかし、 Terai平野の余剰食糧は不足地域に供給されるだけでなく、南側に接するインドに輸出されてきた。それは農産物が主な輸出産品であるネパールにとって、生活必需品を輸入するための重要な外貨源となっている。

国内消費量は約 260万トンであり、数字の上では、自給率はネパール全体では、98～ 107％となっているが、近年の急速な人口増加によって、穀物の輸出余力は減少してきている。

前述のごとく、ネパール全体としては、人口に対する穀物の生産は現状ほぼ見合っているが、供給量の地域格差が非常に大きい。つまり、ネパールの複雑な地形や自然条件は、農産物について生産力輸送力の地域的格差をもたらしている。

(3) 人口と人口密度

1981年のセンサスと年平均人口増加率(2.8%) から推定される現在の両郡の人口と人口密度は、つぎのようであるが、近年、山間部から平地部への人口流入が多いため、実際にはこの推定値を上回っていると思われる。

面積　2,254㎢　　推定人口　868,000　　推定人口密度（㎢当り）385

(4) 地域産業

農業と農業関連製造加工業が主体である。農作物は、自給時速で余剰生産があり、カトマンズへ出荷して収益を得ているほか、砂糖製造工場，たばこ製造工場，製米所，その他小規模家内工業等、比較的よく発達している。

(5) 農　業

当郡の耕地面積率は42%で、約９万haであり、栽培作目は、雨期水稲が主体であるが、サトーキビ，トウモロコシ，小麦，ジャガイモ，大麦，ナタネ，タバコ等も多く生産されている。

現行作付体系は、水田では水稲単作，水稲－豆類，水稲－麦，畑はトウモロコシ－油脂作物，トウモロコシ－タバコが一般的であり、作付率は 130%である。

2．農村復興計画の基本構想

2.1　地域開発計画

本プロジェクトの開発のねらいは、おおむね次の二点に集約される。

(1)　食糧作物と換金作物の増産，搬出を行う生産基盤を整備強化する。

(2)　食糧自給と農産物生産の増産という国家政策に沿い、生産を増加させる事によって食生活の改善と、余剰労働者の就業機会を創造する。

本プロジェクトは、経済的な農業生産に多数の農民を参加させ、それによって、彼らの生活の工場を図ると共に、一方で都市への人口（特に若年層）の流入を抑える意味をもっている。従って、このプロジェクトにおいては、特に農村婦人労働者の参加が考慮されなければならない。プロジェクトの実現によって農業生産が増加し、食糧価格の安定供給がもたらされ、都市周辺北部山岳地帯の低所得層にも手の届く範囲内に価格の抑制が可能となる。そこで本プロジェクトの実現にあたっての基本構想は次の５項目の具体策を重点に計画されることが望ましい。

(1)　小規模農家を組織化し、農村落における生産と都市への恒常的供給を行う体制，組織機能を強化して行く。

(2)　二国間援助，又は国際機関による技術援助で成功した農業生産開発プロジェクトの生産技術をとり入れて、農業の生産向上，ポストハーベスト，マーケッティングの技術普及を行う。

(3)　究極的には、農業生産，農業生産資材の調達，販売等を行う多目的な農民グループ，共同組合活動を助ける。

(4)　プロジェクトにおいて、農民のトレーニングならびに農業普及員の教育，地元の機械工，一般技能の教育を行う。

(5)　作物の生産圃場，諸施設を備えた総合的モデルを建設する。特にポストハーベストや商品化マーケティングマネージメントは重要である。

中・長期的目標

－食糧自給と小規模地域アグロ，インダストリーの促進

－農産物の付加価値増進，畜産の導入促進

－粗放農業の縮小と、環境保全

－穀物を初めとした農産物の対外搬出強化

－農村生活基盤の整備

－灌漑排水施設建設（地区農道整備も含む）

－洪水防止用土堤の建設及び排水機場の建設

－地区内畑造成工場

－アクセス道路及び河川横断橋建設

農業機械調達計画

所要機械として下記のものがあげられる。

－汎用トラクター

－小型耕運機

－自動噴霧器

－穀物軽量器

－給配水車

－ダンプトラック

－運搬用車輌

プロジェクト実施後の運営・維持管理

プロジェクト実施後の運営・維持管理の実施主体は、農業省に移管する。基本的には、現在、尚地区で実施されている維持管理体制の拡大，補強で新開発地区の運営維持管理を実施する。

日本の技術援助の可能性

当該開発計画を実施するのに、以下の理由により、日本の無償援助が期待できる。

－調査を含めた実施計画を日本の無償援助で実現できれば、無償援助の仕組みを考慮に入れると早期に計画の実現ができる。

－日本における高い管理技術，防災技術の導入可能である。

調　査　団

前記実施工程に従って考えられる専門家の人月は以下のようになる。

1)　フィジビリティスタディー

専　門　家	期　間
・団長（農村開発）	4ヶ月（現地　3ヶ月，　国内　1ヶ月）
・灌漑排水技師　(1)	4ヶ月（現地　3ヶ月，　国内　1ヶ月）
・灌漑排水技師　(2)	2ヶ月（現地　1ヶ月，　国内　1ヶ月）
・農道建設	2ヶ月（現地　1ヶ月，　国内　1ヶ月）
・気象・水文専門家	2ヶ月（現地　1ヶ月，　国内　1ヶ月）
・測量技師	4ヶ月（現地　3ヶ月，　国内　1ヶ月）
・農業及び事業評価専門家	4ヶ月（現地　3ヶ月，　国内　1ヶ月）

計　22ヶ月

2)　基本設計調査

専　門　家	期　間
・団　　長	2ヶ月（現地 0.7ヶ月，　国内 1.3ヶ月）
・灌漑排水技師　(1)	4ヶ月（現地　2ヶ月，　国内　2ヶ月）
・灌漑排水技師　(2)	2ヶ月（現地　1ヶ月，　国内　1ヶ月）
・農道建設	2ヶ月（現地　1ヶ月，　国内　1ヶ月）
・気象・水文専門家	2ヶ月（現地　1ヶ月，　国内　1ヶ月）
・測量技師	4ヶ月（現地　2ヶ月，　国内　2ヶ月）
・農業及び事業評価専門家	4ヶ月（現地　2ヶ月，　国内　2ヶ月）

計　20ヶ月

3)　基本設計調査

専　門　家	期　間
・団　　長	1.5ヶ月（現地 0.5ヶ月，　国内　1ヶ月）
・灌漑排水専門家	4ヶ月（現地　1ヶ月，　国内　3ヶ月）
・農道建設	2ヶ月（現地　1ヶ月，　国内　3ヶ月）
・施工計画・積算専門家	4ヶ月（現地　1ヶ月，　国内　3ヶ月）
・農業機械専門家	2ヶ月（現地 0.5ヶ月，　国内 1.5ヶ月）
・入札書類作成専門家	3ヶ月（現地 0.5ヶ月，　国内 2.5ヶ月）

計16.5ヶ月

2.2　ネパール食糧流通促進計画

ネパール国の食糧流通事情は南部平原穀物生産地域と中・北部の耕地・山岳地帯の消費地に分かれている。生産地と消費地では食糧備蓄に大きな格差があり、それが元になって食糧安全保障上大きな消費地域での不安要因となっている。特に山岳地域では地形的困難が加わりアクセス，輸送手段の発展を遅らせている。

ネパール政府は第５次国家計画の中で地方開発と地域格差の是正を目指している。食糧対策は国民の保健，栄養政策の中で最も基本を担う問題であり、最重視されている。

さらに山岳地での食糧倉庫の建設計画はただ単に食糧備蓄，食糧配布の視点からのみならず、山岳農業促進にも大きく貢献するものである。それは山岳地における収穫物の保存，輸送調整の役割を果たす事により山岳農産物である穀物や雑穀の集出荷を可能にし、特にネパールでも経済未発達地である山岳農村地帯での農産物市場化，商品化を促進するものである。設備計画は地形的建設環境を考慮して、建設資材輸送，ローカル技術のかからない建築様式にすべきである。以下英文添付書類に記載する。

4．調査団略歴及び調査日程

(1) 調査員の略歴

ナミサト　ツギオ
並　里　次　雄

昭和19年　2 月18日生	
昭和42年　3 月	名城大学農学部農学科卒業
昭和54年 10 月	チュニス大学自然科学部大学院
	終了（博士号取得）
S.43.11 ～S.45.12	㈱ゲンキ乳業
S.46. 1 ～S.49. 3	青年海外協力隊（フィリピン）
S.49. 9 ～S.54. 8	国際協力事業団（専門家）
S.54.10 ～S.56. 9	国連食糧機構（FAO）ｻﾌﾞﾌﾟﾛｼﾞｪｸﾄﾏﾈｰｼﾞｬｰ
S.57. 2 ～S.59. 8	世界開発銀行（UNDP）ﾌﾟﾛｼﾞｪｸﾄﾏﾈｰｼﾞｬｰ
S.62. 9 ～ 現　在	㈱建設企画コンサルタント
	海外本部　部長代理

(2) 調査日程

－調査期間　：　平成元年１月19日～２月５日（７日間）

－調査日程　：

月	日	曜日	
2	19	日	成田発　→　バンコク
	20	月	バンコク　→　カトマンドウ
	21	火	ＪＩＣＡ，日本大使館訪問
	22	水	ＦＡＯ，ＵＮＤＰ，ＥＣ事務所打合せ
	23	木	農業省，食糧公社打合せ
	24	金	橋口ＪＩＣＡ専門家，三●専門家　打合せ
	25	土	資料整理
	26	日	現地踏査
	↓		
3	1	月	現地踏査
	2	火	農業省，土木局打合せ
	3	水	カトマンズ　→　バンコク
	4	木	資料収集及びＵＮＤＰ打合せ
	同	夜	バンコク
	↓		↓　機中泊
	5	金	成　田

4．資料収集リスト

資　料

Agricultural Indication Nepal

Nipal agricultural Pricing Policy

Food Startistic Nepal

Statistical Year Book of Nepal 1991

Approach to the Fighth plan 192-97

Rural development planning in Nepal

Environment and man in Nepal

書籍ネパール国統計

Conservation for development in Nepal

Land shides and soil erosion in Nepal

Agriculture & industrial finance in Nepal

Sales Promotion in Nepal

Planning for Agricultural development in Nepal flower and tree of tropical

地　図

全国地図

植生地図

5．面会者リスト

ＪＩＣＡ関係者

亀田所長，永友次長，三●，橋口，佐藤

利田，渡辺，河田，川合各専門家

DR. Nirmal. K. Bista

General Manager of Nepal food corpolation

DR. B. B. Kshetry

Deputy General Manager

MR. M. M. Prodhan

Dinirion Manager

MR. J. S. Nayaupune

Director of Nepal Suger Corpolation

DR. B. L. Maharjan

Directer General Food and Agricultural Morketing

Ministry of Agriculture

サルラヒ地域プロジェクトエリア風景

ネパール国の食糧倉庫

1. Background

(1) Geography

Kingdom of Nepal occupies 140,000km² of land situated between 26°20' and 30°10' of the northern latitude and between 80°15' and 88°5' of the eastern longitude stretching 220km of north and south and 880km of east and west rectangularly.

Topographically it is divided into three areas likely sub-tropical monsoon area of the south, 200m-700m elevation's temperate hilly area in the north, and the frigid Himalaya Mountains area in the further north.
The southern low land area is called Terai Plain bordering to India. Mid-hilly area is historically and geographically central of Nepal, and connected mountainous area to the north.
Nepal is divided into five development regions by north to south boundaries owing that the traffic between east and west is difficult due to the mountains and rivers, however it is easier between north and south.
Five development regions are divided into 14 zones and further into 75 districts.

(2) Food production and consumption

Total arable area is 2.46 million hectare which is cultivated with rice(63%), corn(30%), wheat(26%)and others(9%).
Average cereal crop production is 2.60 to 2.80 million ton of which two third is produced in the granary Terai plain, whereas the Terai is food exporting area. While the hilly area where the population is two third of the country produces one third of the total production and chronically lacking of food. However, excess food of the Terai has been provided not only to the lacking area but also exported to India bordering to the south and it became to the foreign currency to buy the necessaries of life.

Domestic food consumption is 2.6 million ton, which shows the self sufficiency rate of 98-107% but recent rapid increase of population has been reducing her export capability.

Data are from 'Statistical Yearbook of Nepal, 1989.'

4) Social condition

(1) Administration unit

The smallest administrative unit of Nepal is the congregated body of villages, towns and districts level called Panchayat and there are 59 panchayats respectively in the Sarlahi Districts.

The Panchayat is consisted of 9 wards and the chief is elected publicly but chives of the district and zone are nominated by the parliament.

(2) Population and population density

The population of the two districts estimated from the 1991 census and annual population growth rate (2.8%) is as follows but recent population flow from mountain area to the flat land area might excess the estimate actually.

Area: 2,254 km^2 Population: 868,000 Population density: 385/km^2

(3) Local industry

Main industries of the districts are agriculture and agriculturally related manufacturing industries. Agricultural crops are self sufficient and the excess is marketed in Katmandu. sugar factories, tobacco factories, rice mills and small scale domestic industries are well developed in the districts.

(4) Agriculture

Arable area of the two districts is 94,700 ha occupying 42% of the land and is cultivated mainly with rainfed rice followed by sugarcane, corn, wheat, potatoes, barley, rape seed, and tobacco.

Present cropping pattern is: paddy field-mono rice cultivation, rice-legumes, rice-wheat upland field-corn-oil crops, corn-tobacco Cropping intensity is 130%.

The Ministry of Agriculture aims at developing the River Basin for independent small holders; the Servay Team feel that the organization and measures that have been introduced in the agricultural sector so far, could very well contribute to the implementation of the project. In this respect the following features may be mentioned: extension and supply of inputs, technical assistance e.g. in land preparation, introduction of the block-farming system, marketing and processing, and the establishment of cooperative producers' societies.

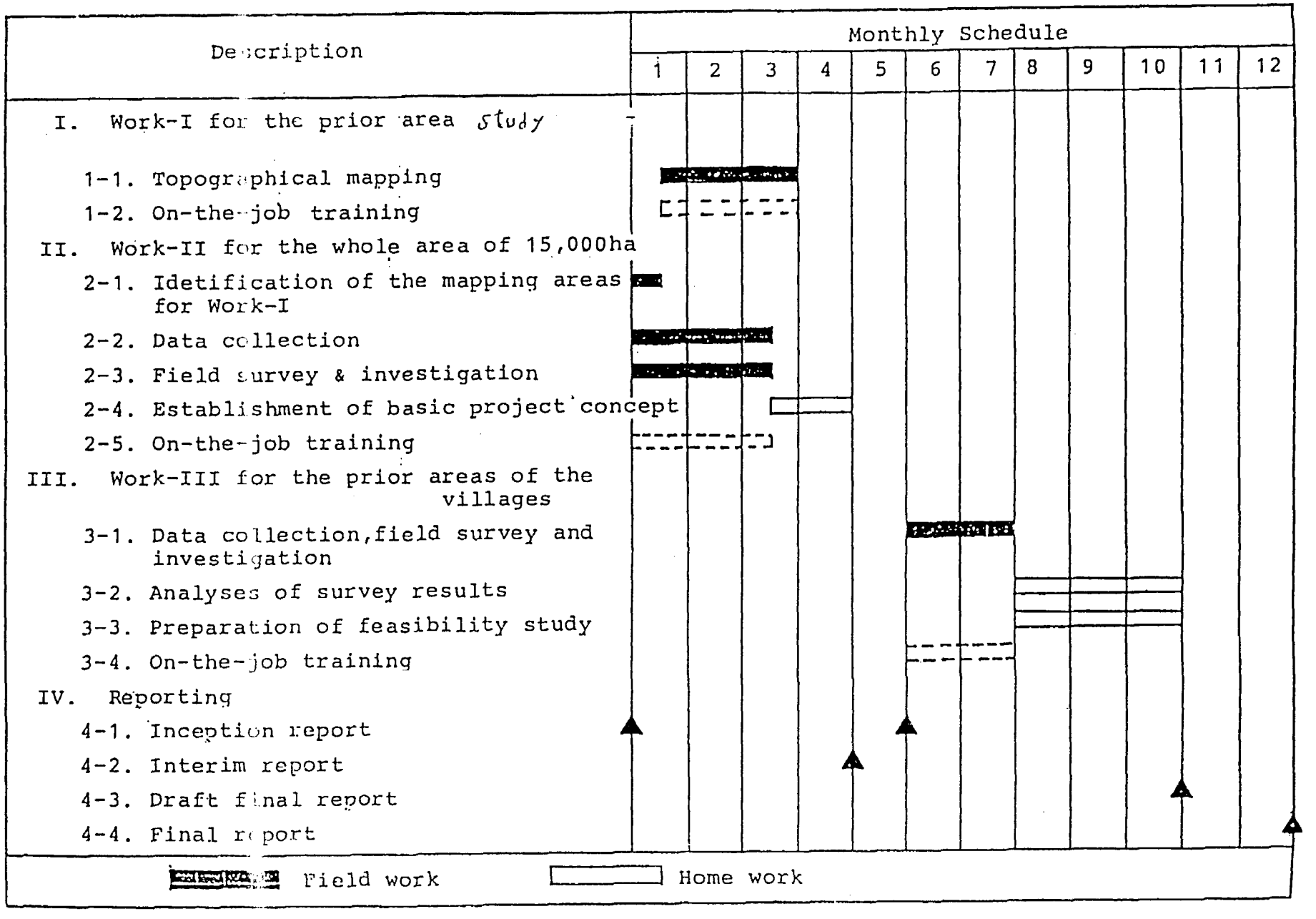
If the government decides to introduce post harvest, agro product marketing system and agriculture, which would call for a full feasibility study, the following surveys and investigations would have to be started or completed:

- topographical surveys (center lines of canals, construction sites);
- agro-hydrological and hydrological surveys;
- geo-technical investigations;
- a sociological survey;
- agricultural research.

should the improved rainfed system be implemented, some supplementary investigations would be needed as well, viz.:

- sociological survey;
- agricultural research;
- agro-hydrological survey.

TENTATIVE SCHEDULE



2-5. Facility and Equipment

1. Model Farm Construction

1)	Construction of Pilot Farm	150 ha
2)	Construction of Access Road	1 set
3)	Construction of Drainage	1 "
4)	Bridge	1 "
5)	Training and Experimentation Building	1 "
6)	POrtable water facility	1 "

2. Agricultural Machinery and Horticultural Facilities

1)	Sprinkler System	1 set
2)	Tractor Plow	1 "
3)	Tractors	3
4)	Trailers	2
5)	Disk Plows	2
6)	Disk Ridger	2
7)	Power Sprayers	10
8)	Diesel Generators	2
9)	Land Cruisers	3
10)	Seed Selecting Facility	1 set
11)	Pump for Seed Bed	2
12)	Nursery Facilities	1 set
13)	Vegetable Seed	1 "
14)	Fertilizer	1 "
15)	Agricultural Chemical	1 "
16)	Lawn Mower	10 sets
17)	Office Utensil	1 set

PROJECT PROPOSAL

FOR

CONSTRUCTION OF PORTABLE GRAIN WAREHOUSES

IN MOUNTAIN AND HILL REGIONS OF NEPAL

Contents

Page

1. Introduction
2. General Background
3. Profile of Districts
4. The Project
   - 4 - 1 Title
   - 4 - 2 Objectives
   - 4 - 3 Proposed Scale and Quantity
   - 4 - 4 Contents
   - 4 - 5 Specifications of Warehouses and Operating Equipment
   - 4 - 6 Implementation Method
   - 4 - 7 Project Cost
   - 4 - 8 Implementation Schedule
   - 4 - 9 Project Benefit
5. Organization Structure of NFC
6. Location Map of Proposed Sites of Portable Grain Warehouse
7. Area and Population
8. Food and Agriculture Balance Sheet of Nepal (1979/80 to 1988/89)
9. Districtwise Harvested Area & Production of Cash Crop

ANNEX

1. Office Net Work of NFC
2. Warehouse (Storage) Network of NFC
3. Food Procurement Network in Nepal
4. Food Grain Transport Network of NFC
5. Organization Structure of NFC
6. Location Map of Proposed Sites of Portable Grain Warehouse
7. Area and Population
8. Food and Agriculture. Balance Sheet of Nepal (1979/80 to 1988/89)

1. Introduction :

Nepal is a landlocked country lying between India to the South and China to the North. With an estimated GNP of US$170 in 1983. Nepal is one of the poorest countries of the world. Climatic and geographic conditions divide Nepal into zones with differing agricultural production potentials. Consequently, foodgrain movements from surplus to deficit areas have constituted a traditional pattern in the life of the inhabitants. The terai in the South is by far the most productive area regularly producing surplusses of the staple food rice, which are transported to the deficit Hills and Mountains. Exports to India, either official or unofficial across the 1,500 km open border, are also a common feature. The Hills, which comprise high ridges and steep slopes interspersed with many fertile valleys, produce some 35% of the nation's foodgrains, but with over 60% of population many areas are in deficit. The mountain areas having less than 5% of the population are in deficit. With a population growth of 2.66% per year, the stress on existing agro-ocosystems in resulting in erosion and declining yields.

The transport and communications network in limited in the extreme. The road system is restricted to the Terai and the accessible Hills, genrally those adjacent to the Terai, while other areas can only be reached on foot or, where a landing strip exists by air. Thus apart from the accessible Hill areas which can be supplied by road vehile, all other areas can only be supplied with foodgrains by pack animal, human porters or in a few locations by air. Many of these inaccessible areas are isolated at times in the year due to snow, swollen or flooded rivers and landslides.

While traditionally having been a surplus foodgrain producer, surplusses have been diminishing and in adverse years have led to the need to import food. This occured in 1991/92 when some tonnes were imported, mostly under various aid programmes. The general availability of food in the country is made more complex by the open border with India, where grain flows freely, either officially or unofficially, across the border in either direction depending upon market conditions.This forces government to pay constant attention to adequate preparation and improvements of all matters connected with the country's food security situation and, consequently, to the foodgrain marketing sector as a whole, responsible for 75% to 85% of the calorie intake.

His Majesty's Government (HMG) in recognising the problem regarding the movement of grain, has placed a high priority on remedying the situation. With assistance from various donor agencies, e.g. FAO, World Bank, UNDP and bilateral donors HMG has developed and adopted a policy for strengthening food security in the country, which is now included in its 8th Five Year Plan. Broadly the policy endeavours to stimulate foodgrain production through price support to the producers; encourage the private sector to provide for the needs of the population in the accessible Hill areas with the parastatal Nepal Food Corporation (NFC) performing a consumer price stabilisation role; provide adequate availabilities of basic foods at subsidised prices in the inaccessible Hills and Mountains where some of the most vulnerable sectors of the population live and to improve the foodgrain reserve stock policy through proper maintenance of sufficient reserve stocks for:

- foodgrain distribution to food deficit areas,
- emergency supplies in case of disasters and food shortage situations until outside replenishments arrive.
- price stabiization measures in the interest of the low income consumers in the consumer centres of the accessible hill areas and the Terai.

A major component for the realisation of this policy is the development of the necessary infrastructure to establish stocks of grain at strategic locations to ensure a continuous availability of foodgrains. Unless these technical preconditions have been established, the implementation of the envisaged marketing improvement programmes will be hampered. Since the beginning of the 1970's HMG commenced to give priority to storage construction programme including storage projects by:

- UNDP 1976-82 for 7500 tons at 7 locations
- ODA/UN 1978-85 for 12000 tons at 2 locations
- IDA/HMG 1981-86 for 27000 tons at 5 locations
- JAPAN 1985-88 for 10500 tons at 4 locations
- CEC 91 for 2150 tons at 10 locations

The Nepal Food Corporation, as the organization of the government entrusted with the technical and operational execution of all foodgrain marketing activities at present possesses a storage and office network as shown in Annexes I and 2.

With the completion of five storage sites constructed under the IDA Grain Storage Project in the Eastern and Central Regions and the development of the storage facilities in the Far and Mid-Western Regions with the assistance of the Government of Japan, the technical preconditions for the implementation of the envisaged primary procurement and reserve stock policy in the Terai belt are now within reach.

There is a need to construct additional storage capacity in the Hills and Mountains so that adequate stocks can be held in these areas and the need for hiring expensive and unsatisfactory stores from the private sector can be avoided. The policy of Government, endorsed by FAO, is to maintain a minimum stock of 4 months' usage in the remote Mountains and 3 months' in the Hills. This would ensure adequate supplies to cover for the needs of these areas even during those periods of the year when they are isolated due to snow floods and landslides. To meet these needs in the adjacent hill and mountain areas of mid-western region NFC requires at present an additional storage capacity of tons in the Hill districts and of tons in the mountains.

2. General Background :

Production of foodgrains, cash crops and potatoes, fruits and vegetables is still less than the target set up in the Seventh Five Year Plan 1985/86 1990/91.

In Nepal, agricultural production is more or less influenced by the amount of rainfall and due to the mountainous terrain expansion of cultivated land is not easy. Nevertheless, the above achievements in agricultural production have been made. This is due to an increase in the yield per unit area, achieved by internsive farming by means of expansion/replenishment of irrigation facilities, the use of chemical fertilizers, etc.

Now, in the Eighth Five Year Plan (1992 - 1997), various agricultural modernizations are planned to aim at further increasing agricultural production. In mountain and hill regions which comprise 78% of the total land area of Nepal, the improvement in living conditions of small farmers is considered an important part of the Eighth Five Year Plan. Small farmers in mountain and hill regions are forced to live in poverty compared with farmers in the Terai region. Their productivity is low and their working conditions are very severe. Moreover, transportation of their agricultural products is primitive and dependent on man and animals. Their products are therefore very few on the market due also to the lack of a proper distribution system, lack of storage facilities, etc. The Eighth Five Year Plan also indicated that there is no proper system of regularly collecting production statistics of fruits, vegetables, meat, eggs, etc.

In view of the present situation, the Eighth Five Year Plan makes provision for at least one grain warehouse to be set up in the mountain and hill region of each district. This will contribute significantly to the living conditions of those farmers who are solely dependent on agricultural production. They will be able to increase their production and consign these products to the grain warehouse. It will also be possible for them to use these grain warehouses for an increased production of fruit and vegetables for export. Setting up such grain warehouses will greatly help to control the marketing of their agricultural products.

Normally, grain warehouses are of three catagories: large scale warehouses of 5,000 MT medium scale warehouses of 800 - 1,000 MT, and small scale warehouses below 500 MT. In this proposal, the construction of small scale portable, prefabricated warehouses in mountain and hill regions where transportation is not easy, will be recommended.

3. Profile of Districts :

19 Districts are listed and their profiles are as follows. Their locations are shown in Fig-1

a: Elevation b: Area c: Population(1980) d: Area under Cultivation

1) Arghakhanchi - Sandikharka, Lumbini Zone
   a: 305-2, 515m b: 1,331km² c: 154,603 d: 24,221ha
2) Gulmi - Tamghas, Lumbini Zone
   a: 610-3, 050m b: 1,245km² c: 270,407 d: 15,000ha
3) Piuthan - Khalanga, Rapati Zone
   a: 305-3, 659m b: 1,365km² c: 165,542 d: 11,900ha
4) Rolpa - Liwang, Rapati Zone
   a: 70-3, 639m b: 2,194km² c: 196,421 d: 4,300ha
5) Rukum - Musikot, Rapati Zone
   a: 762-6, 072m b: 1,939km² c: 116,067 d: 4,700ha
6) Dolpa - Durai, Karnali Zone
   a: 1525-7, 625m b: 8,093km² c: 21,514 d: 2,600ha
7) Jumla - Khalanga Bajar, Karnali Zone
   a: 915-4, 679m b: 2,824km² c: 137,847 d: 5,500ha
8) Humla - Simikot, Karnali Zone
   a: 1524-7, 337m b: 6,131km² c: 35,155 d: 3,600ha
9) Kalokot, Karnalo Zone
   a: 1500-4, 790m b: 1,740km² c: 11,976 d: 6,500ha
10) Mugu, Karnali Zone
   a: 1524-7, 045m b: 3,103km² c: 28,882 d: 2,600ha
11) Dailekh, Bheri Zone
   a: 544-4, 168m b: 1,560km² c: 188,123 d: 11,400ha
12) Jajarkot, Bheri Zone
   a: 610-5, 412m b: 2,218km² c: 104,340 d: 9,500ha
13) Doti - Silgadhi, Seti Zone
   a: 305-3, 430m b: 2,916km² c: 200,195 d: 20,400ha
14) Bajura - Tante, Seti Zone
   a: 915-7, 036m b: 1,589km² c: 68,886 d: 9,500ha
15) Bajhang - Chainpur, Seti Zone
   a: 915-7, 035m b: 3,449km² c: 121,981 d: 9,200ha
16) Achham, Seti Zone
   a: 1220-3, 820m b: 1,372km² c: 159,363 d: 8,600ha

17) Bajura - Kuli, Seti Zone
a: 762-7, 039m b: 1,589km² c: 68,886 d: 9,500ha

18) Dadheldhura - Khalanga, Mahakali Zone
a: 457-2, 439m b: 1,769km² c: 114,199 d: 13,518ha

19) Darchula - Darchula Khalanga, Mahakali Zone
a: 518-7, 134m b: 1,867km² c: 77,337 d: 4,600ha

4. The Project :

4 - 1 Title

Construction of Portable Grain Warehouses in Mountain and Hill Regions of NEPAL.

4 - 2 Objectives

Technical improvements are gradually being introduced for intensive farming in mountain and hill regions where agricultural production is low, so it is expected that productivity will increase. If a well organized distribution system of agricultural products is established, many small farmers can consign their products to the market and raise their will to work and improve their lives.

Many small farmers are waiting for the construction of grain warehouses in mountain and hill regions, where only primitive transportation is still available. These grain warehouses will be used for temporary storage of agricultural products before consignment to the market and for more organized arrangements for negotiating with brokers

The grain warehouses proposed here are portable, prefabricated types because transportation of the materials and construction of the warehouses in the mountain and hill regions will be done by man-power only.

4 - 3 Proposed Scale and Quantity

1) Capacity : 500 Metric tons ... 5 Districts
Gulmi; Doti, Dadeldhura, Rukum Achham

2) Capacity : 300 Metric tons ... 5 Districts
Bajura, Jumla, Dolpa, Piuthan, Bajhang

3) Capacity : 200 Metric tons ... 3 Districts
Rolpa, Darchula, Bajura

4) Capacity : 100 Metric tons ... 6 Districts
Humla, Arghakhanchi, Kalikot, Mugu, Dailekh, Jajarkot

4 - 4 Contents

1) Design of portable grain warehouses
2) Manufacturing and supply of prefabricated grain warehouses
3) Supply of operating equipment
4) Construction of foundation floor
5) Construction of prefabricated grain warehouses

The following equipment should be included to enable efficient handling and storage of food grains:

1) Platform scale 0-200 kg
2) fumigation sheets (9m x 12m) with one set of repair kits
1)hand sprayer
2) moisture meters
1) ladder
1) roll polythene tubes for sand snakes

It is essential that designing and planning of the various storage building is to be done in close consultation with NFC's Technical Department to agree on the kind of design in order to facilitate maintenance lateron

4 - 5 Specifications of Warehouses and Operating Equipment

-Warehouses-

1 Semi-Circular roof type steel warehouse
2 Storage capacity : 70% of total space in warehouse
3 Storage condition: Natural ventilation
4 Standard : Japanese standard
5 Metal supports : Lightweight iron
6 Metal panels : Plated and painted iron
7 Wind durability : 146.3 kg/m^2 (min)
8 Life : 20 years (min)
9 Seismic coefficent: K - 0.1

- Operating equipment-

Scales for weighing products : Max. 5 tons

4-6 Implementation Method

The Executing Agency, Nepal Food Corporation (NFC), has Branch Offices in each region. One of their roles will be training and management service for agricultural production to be offered to farmers belonging to the Village Panchayat Group. NFC will also operate the proposed grain warehouses as part of their service to farmers. In this case, maintenance costs of the warehouses will partly be borne by the farmers group.

4-7 Project Cost

The project cost per unit is estimated as follows:

(Unit, Yen '000

Capacity	Q'ty	Warehouse Cost	Transportation Cost	Construction Cost	Facility Cost	Total
500 MT	5	31,082	4,000	5,000	3,000	215,410
300	5	21,438	3,200	4,000	2,000	153,190
200	3	15,253	2,800	3,500	1,400	68,859
100	6	11,826	2,400	3,000	1,200	110,556
Total	19					548,015

4-8 Implementation Schedule

Commencement - 1993

Completion - 1994

4-9 Project Benefits

- The construction of the godowns in the Hills and Mountains will enable NFC to achieve the policy objective of maintaining minimum stocks of requirements in the Mountains and in the Hills. The maintenance of these stock levels would ensure the availability of adequate food supplies to the population living in the most vulnerable of the deficit areas

- The availability of suitable storage capacity would also obviate the need for NFC to hire godowns in these areas, most of which are substandard and usually result in high storage losses and quality deterioration. More efficient foodgrain handling and reduction of operational costs can also be expected

- The construction of additional storage capacity in the hills and mountains will provide better food security to the population in the food deficit districts of these areas due to sufficient foodgrain reserve stocks in their region.

- Adequate storage facilities, permitting government to maintain sufficient reserve stocks of foodgrain in its possession, allows an influence on consumer prices through stock releases at cost-covering prices in the accessible consumer centres, especially benefitting the low income consumer.

- In a country where local disaster situations can easily occur, this additional security in itself justifies the development of necessary technical facilities as proposed.

BRIEF SPECIFICATIONS OF PORTABLE GRAIN WAREHOUSES

1. Type : Semi-circular roof type steel warehouse

2. Capacity : 100 - 500 MT for dried grains with less than 70% of stored ratio

3. Function : To store dried grains without moisture damage

4. Construction :

1) It shall be composed of prefabricated sectional intermediate units

2) Each main roof, wall and door shall be galvanized panel, pre-painted and ribbed-steel sheet on the frame of lipped light gauge steel

3) Each part of each unit shall not be more than 40 KG in weight

4) Each unit shall be joined by minimum number of galvanized bolts and nuts with other connections

5) It shall have skylight and sufficient steel louver for ventilation with vermin-proof wire grid

6) More than 4 units of ridge ventilator which shall be natural wind power, shall be installed

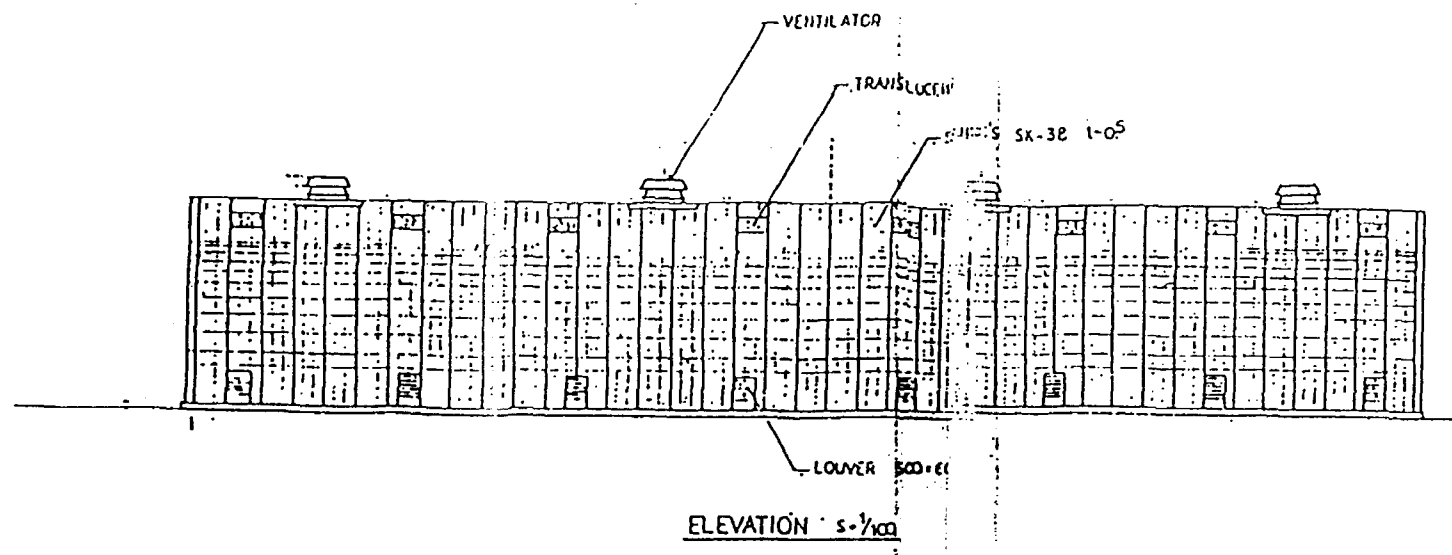
7) The material for skylight shall be transparent plastic plate

8) The building shall be designed under the following conditions :

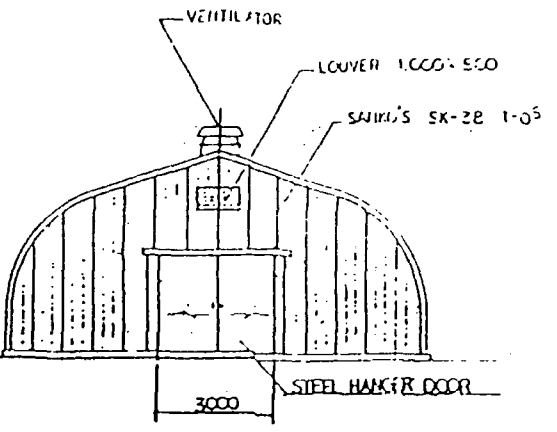
a) Wind durability : 140 KG/M2 (min)

b) Seismic coefficient : K = 0.1

c) Structual calculation : Design standard for steel structure of Japan



ELEVATION s-1/100



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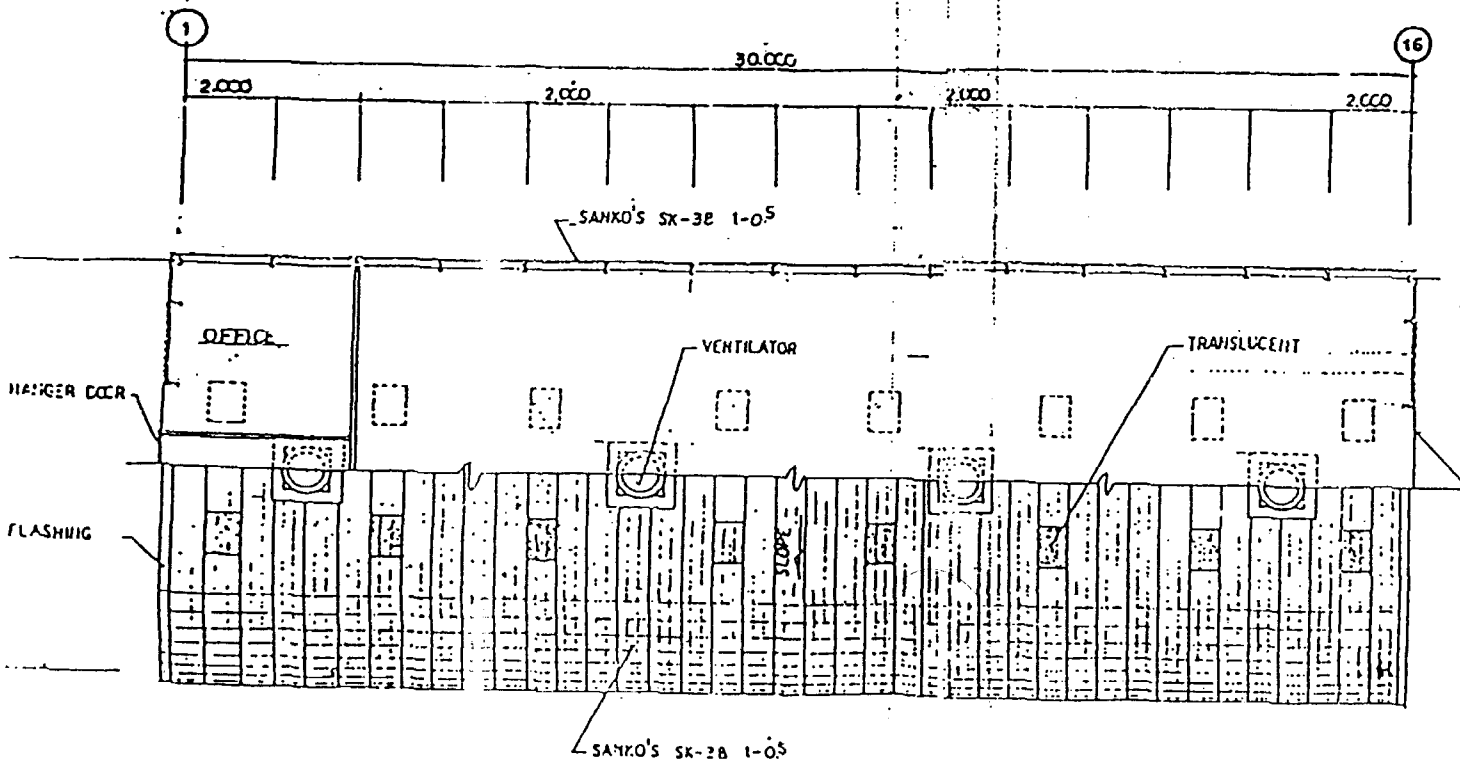

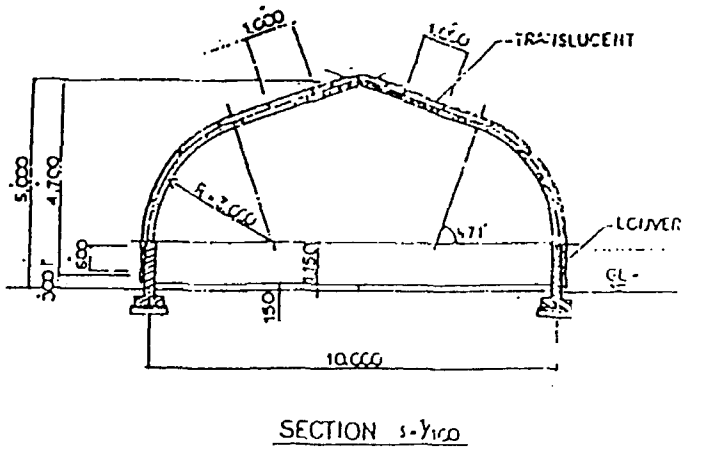

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