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SUMMARY OF DETAILED PLAN OF ACTIVITIES FOR THE

BLUE NILE HEALTH PROJECT IN SUDAN

**Comprehensive Approach to the Prevention
and Control of Water-Associated Diseases
in Irrigated Schemes**

**FOR THE
INTERNATIONAL DONORS MEETING**

1980

BLUE NILE HEALTH PROJECT

SUMMARY OF DETAILED PLAN OF ACTIVITIES - 1979 TO 1981

This detailed plan of activities for the Blue Nile Health Project is organized by three geographical zones: the Rahad Zone, the Gezira-Managil Zone and the Study Zone. While the Project is designed to control malaria, bilharzia and diarrhoea, the activities are an integral programme, thus they occur in the following sequence: Project organization, Management, General survey, Selection of indicator sites, Geographical reconnaissance and mapping, Base-line data collection, Intervention, Evaluation, Research and training, Coordination, and finally Reporting. Thus the list of activities, requirements and budget are arranged in that sequence.

I. OBJECTIVES

In the Rahad Zone the primary emphasis is on early elimination of bilharzia infections in residents, to prevent transmission from occurring when the snails invade the irrigation system. Also molluscicides are held in reserve and environmental measures will be used to minimize potential for transmission, especially among seasonal labourers. Spraying of houses for mosquito control will gradually be reduced as control of larvae and treatment of infected persons progresses. Diarrhoeal disease will be reduced through improvements in community sanitation and distribution of Oralyte salts with appropriate education.

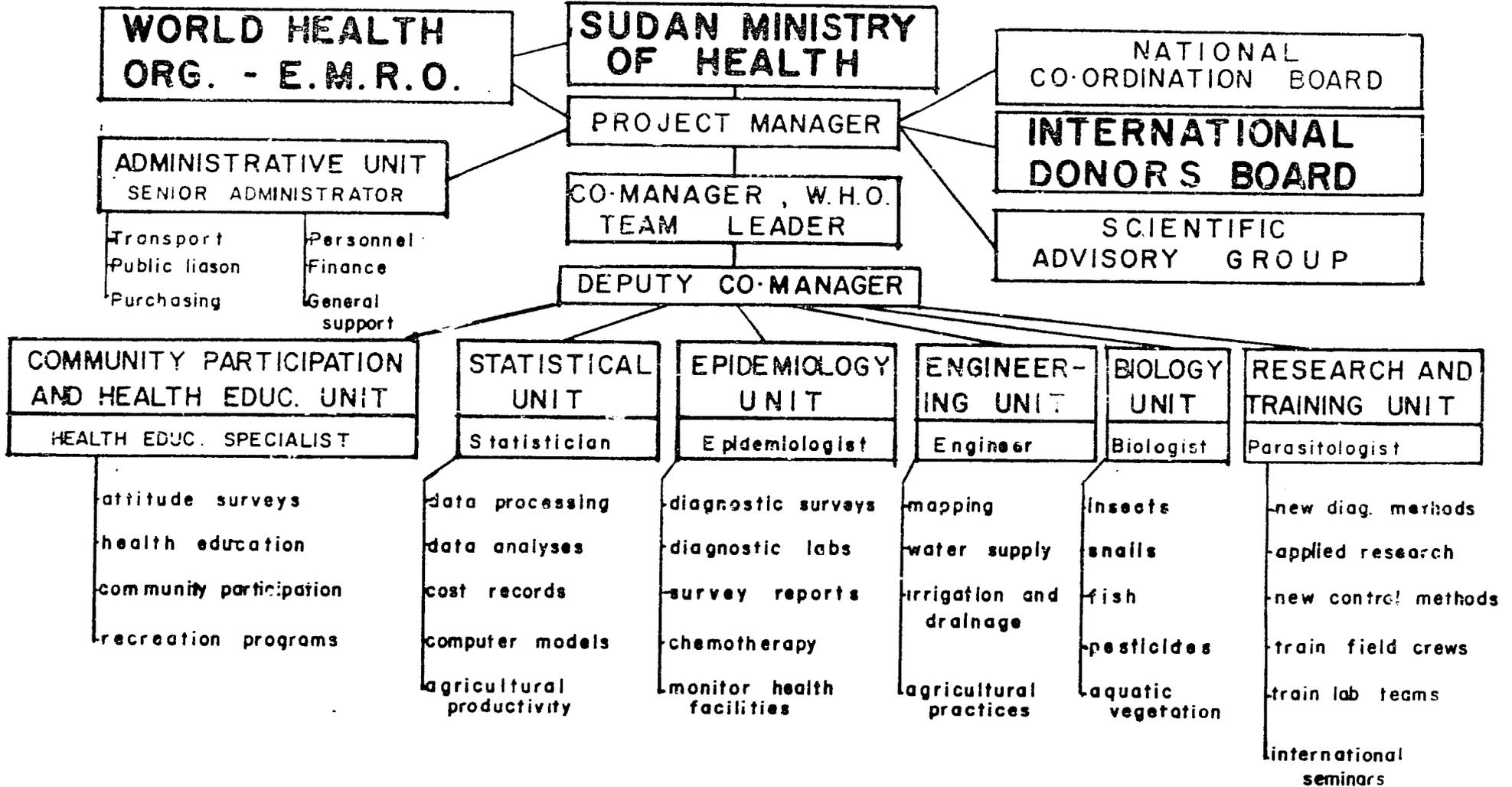
The large Gezira-Managil Zone will initially be improved by introduction of certain well-proven methods of control, by training of personnel, by repair of water supply systems, by construction of new water supplies, and by reduction in house spraying for mosquitoes as larvae control measures are expanded and malaria infections decrease.

The Study Zone will be carefully surveyed, including at least a year of baseline surveys before a trial comprehensive strategy for all water-associated diseases is initiated. After 3 years of intervention, the strategy will be evaluated and expanded to the other zones.

II. PROJECT ORGANIZATION

The Management of the Project will include the Project Manager, the Co-Manager, and a Deputy Co-Manager. They will be assisted by a Director of Administration with sections on Transport, Purchasing, Personnel, Payroll, etc. As for technical supervision there will be 6 Unit Directors: for Community Participation, Statistics, Epidemiology, Engineering, Biology, and Research and Training.

BLUE NILE HEALTH PROJECT ORGANIZATION CHART



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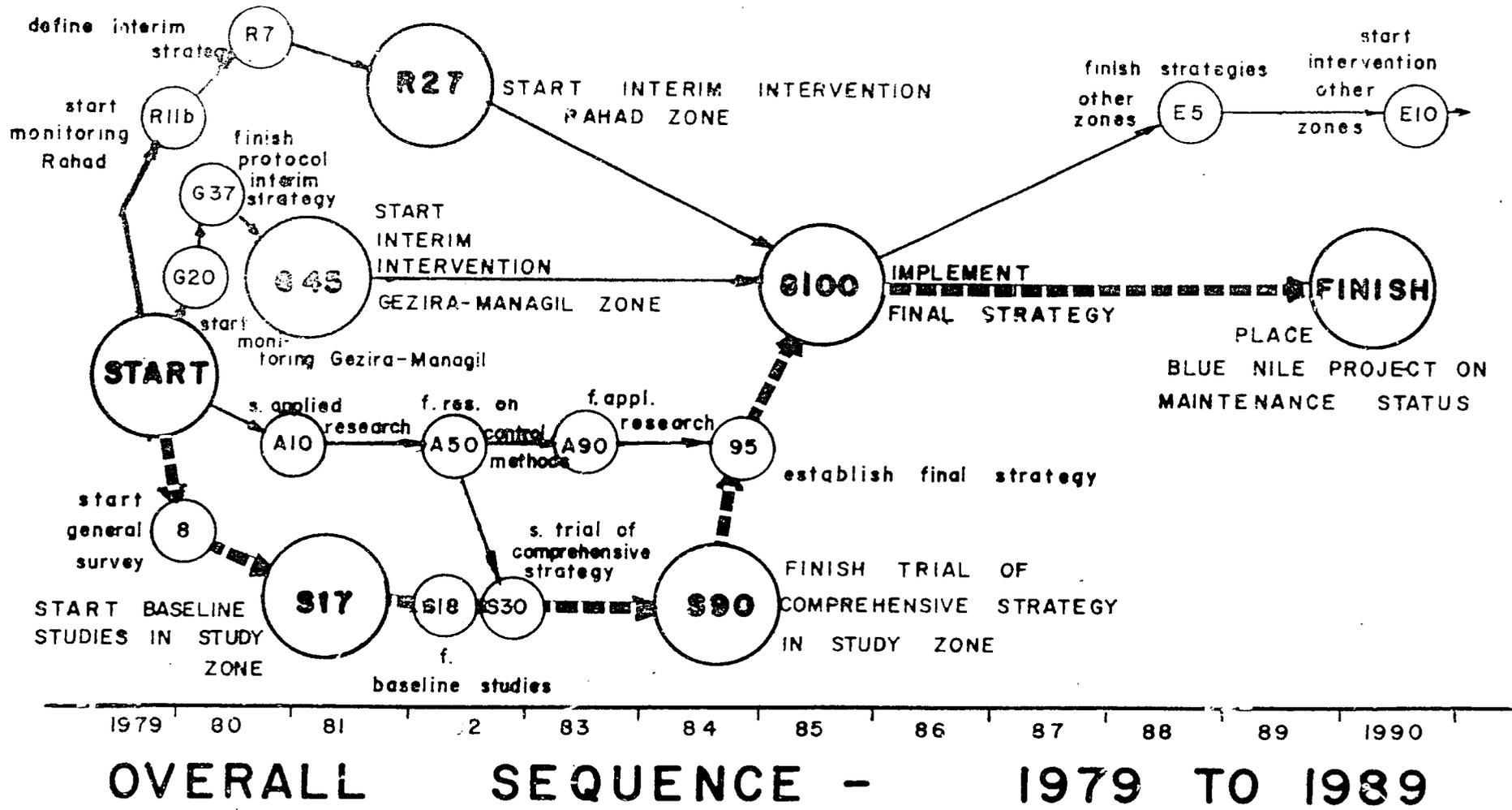
This Detailed Plan of Activities is organized by Zone, including an Events Chart, a List of Activities, and Requirements. The List of Activities includes separate pages showing activities leading to each Major Event:

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IV. OVERALL CHART OF EVENTS FOR TEN YEARS OF PROJECT

For the first 5 years activities will proceed in 4 parallel paths; in the 3 Zones and in Research and Training, eventually resulting in definition of the Final Comprehensive Strategy and its costs, effects and benefits. During the second 5 years this strategy will be put in operation throughout the Project Area, and expansion will be initiated to irrigation schemes elsewhere.

CHART OF EVENTS - BLUE NILE HEALTH PROJECT



ESTIMATED BUDGET IN DETAIL
PROVISIONAL COST-ESTIMATES IN THOUSANDS OF US DOLLARS, IN 1973 PRICES

EXPECTED CONTRIBUTORS	1979**	1980	1981	Total for Ten Years	DISTRIBUTION FOR TEN YEAR TOTAL				
					Project Office & Units	Malaria	Bilharzia	Water Supply	Environmental
I. Government									
- Present Budget	5 821	5 841	5 861	60 510	0	14 000	6 000	28 210	12 300
- Additional	718	1 398	1 901	29 003	2 727	8 062	4 756	2 818	10 640
Subtotal Government	6 539	7 238	7 762	89 513	2 727	22 062	10 756	31 028	22 940
II. Bilateral and International Agencies									
- International Staff	150	450	450	3 500	3 500*	*	*	*	*
- Subsidies	50	100	100	850	850*	*	*	*	*
- Supplies and Equipment	468	2 361	2 000	32 627	80	726	673	19 768	11 380
- Transport	506	363	96	4 253	570	424	1 349	160	1 750
- Pesticides	420	453	438	6 204	0	4 157	1 047	-	1 000
- Drugs	137	151	152	1 990	0	596	1 394	-	0
- Contracts	0	0	124	8 444	0	0	0	8 444	0
- Contingencies	184	412	357	7 262*	6 262	*	*	*	1 000
Subtotal International	1 731	4 290	3 717	65 130	11 262	5 903	4 463	28 372	15 130
GRAND TOTAL	8 455	11 528	11 479	154 643	13 989	27 965	15 219	59 400	38 070

* Applies to all activities

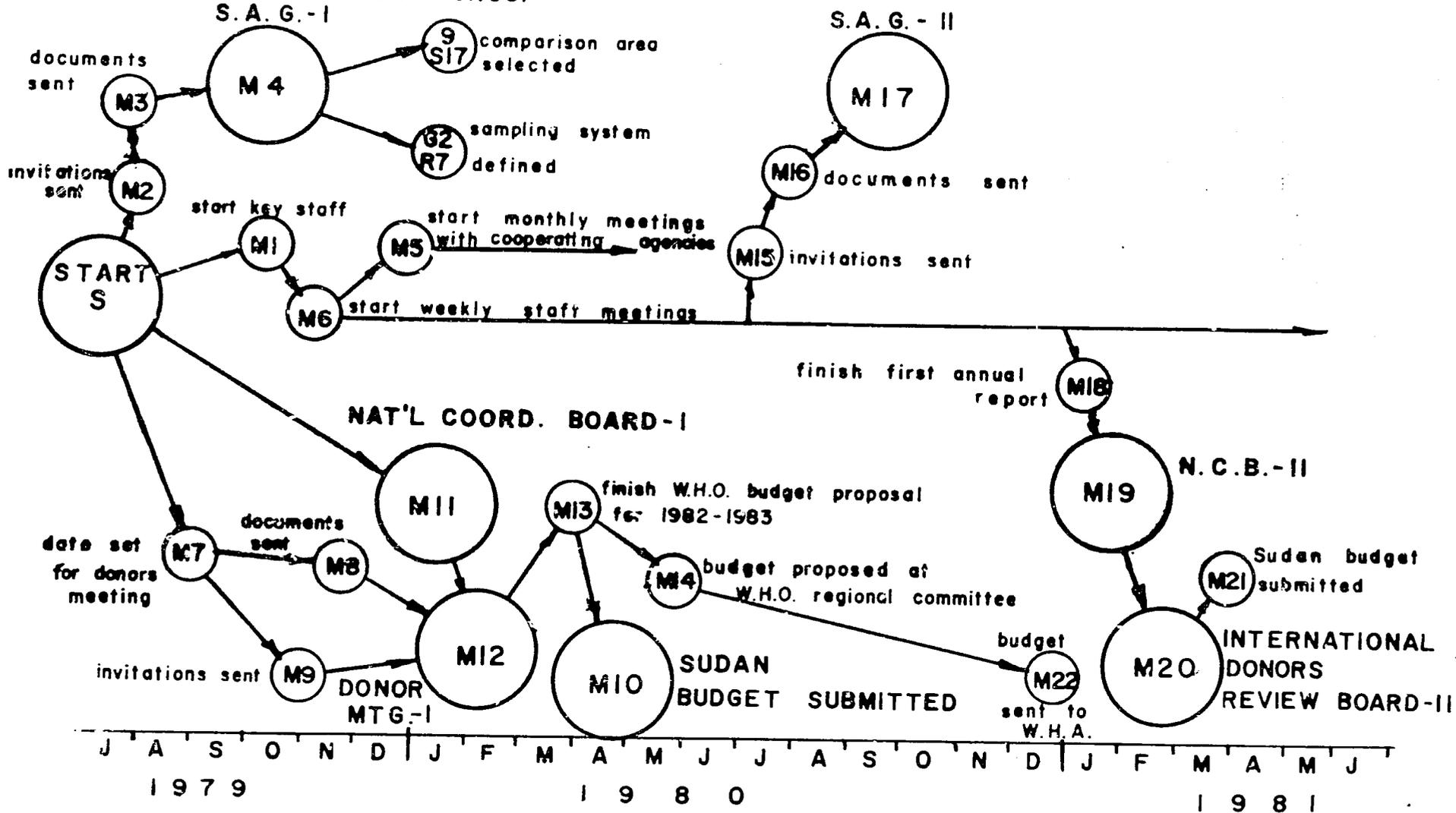
** November 1978 estimates from original Plan : Revised version will be available in February 1980

V. CHART OF EVENTS FOR MANAGEMENT, COORDINATION,
REPORTING AND REVIEW

The Management will establish a National Coordinating Board, an International Donors' Review Board, and a Scientific Advisory Group, each meeting annually. The National Coordinating Board and the International Donors' Review Board will consider and approve the annual budget. The Scientific Advisory Group will review and assess the scientific plan. In addition, the operations of the several provincial and national agencies will be coordinated through monthly meetings. The project senior staff will meet weekly for planning and reporting.

BLUE NILE HEALTH PROJECT

FIRST SCIENTIFIC ADVISORY GROUP



MANAGEMENT EVENTS - INITIAL SEQUENCE

VI. THE RAHAD ZONE

The Rahad Zone consists of the new irrigation scheme opened in July 1978, with a population of 100 000 residents in an area eventually reaching 300 000 acres. During the cotton picking season about 50 000 seasonal workers also move into the Rahad Zone. Bilharzia transmission has not yet started but malaria and diarrhoeal diseases are prevalent.

A bilharzia survey will be made for snails and for infections in residents and migrant labourers. A bilharzia chemotherapy round will be conducted to minimize potential for transmission. An Annual Survey for malaria, bilharzia and diarrhoeal diseases will be initiated early in 1980, leading to development of an Interim Strategy for the Rahad Zone.

House spraying for malaria will continue and the introduction of larvivorous fish, improved drainage, and improved detection and treatment of malaria cases will gradually be developed. When these supportive anti-malaria measures reach an adequate level, the annual house spraying will be gradually withdrawn, beginning in those areas where the potential for malaria transmission is lowest. Eight indicator villages will be annually tested to monitor transmission of these diseases.

Rapid action is necessary for bilharzia prevention in this Zone, with the potential for avoiding thousands of new infections by treating the limited bilharzia cases existing now, in the absence of snails. Thus activities in this Zone have high priority.

Because of rapid and unexpected increases in population, extensive improvements must be made to existing water supply and sanitation facilities.

Act No.	Prev. Event	Start Date	Activity	Month Req'd	Finish Date	Next Event	Unit
	S		Draft Survey Protocols	1		R8A	
	S		Study seas. Labour-Yr-1	3		R8A	
	R8C		Report on seas. Labour	5		R8A	
	8A		Search for Survey Pers.	3		6	
	6		Hire Survey Pers.	1		7B	
	6		Borrow Survey Pers.	3		7B	
	7B		Train Survey Pers.	1		11B	
	M4		Org. Snail Surveys	2		10A	
	10A		Conduct Snail Surveys	3 ea. continuous		13	
	8A		Dev Trial Survey Forms	4		7A	
	7A		Print Trial Survey Forms	1		11B	
	8A		Calc Survey Supplies	1		R9	
	9		Survey Supplies on order	6		11B	
	9		Borrow Survey supplies	4		11B	
	S		Determine Vehicles	4		R3	
	R3		Vehicles on Order	6		11B	
	R3		Borrow Vehicles	6		11B	
	8A		Survey Prot.in Mail	1		8B	
	8B		SAG Reviews Protocol	2		M4	
	M4		Modify Protocols	1		11B	

MAJOR EVENT : START FIRST SURVEY

CALCULATION OF REQUIREMENTS : RAHAD ZONE : Major Event - START FIRST SURVEY

SURVEY TEAMS:

The following teams will do mapping, census, collection of diagnostic samples and snail and entomological surveys during the first year:

- mapping - 1 Jr engineer, 5 engineering assts	for 1 month
- census - 1 Jr sociologist, 2 assts	2 months
- collect diagnostic samples - 1 clinician, 1 PHO	3 "
- examine samples - 10 microscopists, 5 attendants	3 "
- snail surveys - 1 PHO, 1 san. overseer, 10 men (quarterly surveys)	12 "
- entomology surveys - 1 PHO, 5 assistants	5 "

SURVEY FORMS:

The required survey forms, developed on a trial basis, must cover the census, malaria, bilharzia, diarrhoeal diseases, sociology, snails and mosquitoes. There will be 7 village areas monitored with about 400 households per village area. With 20 households per page, this will take 140 pages of census forms. After selection of a 10% sample of the estimated 21 000 people in 7 village areas, the epidemiological forms with 20 persons per page will require 105 pages.

MAPS:

One zone map will show major canals, Blocks and location of Villages. Block maps will show village areas and minor canals. Seven detailed maps of the village areas being monitored will show all households and fine detail of villages and watercourses. Snail and insect data will be recorded on the Block maps.

EQUIPMENT:

The following equipment will be needed for the surveys:

	stains
	glycerine
5000	glass slides and cover slips
1000	urine containers
2000	fecal containers
1000	urine filters
10	centrifuges
100	centrifuge tubes with caps
100	Kato apparatus
5	Millipore filter apparatus
20 000	labels for glass slides and containers
10	glass marking pencils
1	small autoclave
1	surveyors transit, poles and tape
1	set of drafting equipment
1	roll drafting paper
10	clip boards

VEHICLES:

The following vehicles will be needed permanently for the Zone office, but the 5 Station Wagons will be needed only during the annual surveys:

- 1 Station Wagon
- 1 Pick-up
- 5 Station Wagons (2 months)

Act No.	Prev. Event	Start Date	Activity	Month Req'd	Finish Date	Next Event	Unit
	S		Calc Drugs, Basic Supp.	5		R4	
	R4		Drugs on Order	6		R11A	
	4		Basic Supp. on order	6		5	
	4		Borrow Basic Supplies	6		5	
	S		Search for Field Base	7		2	
	2		Modify Buildings	1		5	
	5		Dev System for Chemo.	1		R11A	
	R11B		Map Monitor Areas	1		17	
	17		Make House Maps, Census	1		18	
	18		Collect Diag. Samples	1		20	
	20		Analyse Samples	1		15	
	15		Make Chemo. List	0.1		R11A	
	17		Survey for Mosq.	1		19	
	19		Analyze	1		15	

MAJOR EVENT : START CHEMOTHERAPY

Act No:	Prev. Event	Start Date	Activities	Month Req'd	Finish Date	Next Event	Unit
	S		Calc. Pesticide needs	1		R29	
	R29		Pesticides on Order	6		R30	
	29		Seek Spraymen	1		33	
	33		Train Sprayers	1		30	
	30		Spray all Houses	1		R31	
	R31		Spread Gambusia	2		32	
	32		Evaluate Gambusia	12		R7	
	30		Distrib. Malaria Drugs	4		R31	
	R11A		Complete Bilharzia Chemo	3		R7	
	15		Finish 1st Surv. Report	3		14	
	14		Anal. 1st Surv. Report	3		13	
	R11B		Anal. Surv. Protocols	1		13	
	M4		Design 2nd Study Migr.	2		10	
	10		Conduct 2nd Study Migr.	3		12	
	12		Anal. Migr. Studies	3		13	
	13		Draft Interim Strategy	3		R7	
	15		Revise Survey Forms	1		16	
	16		Codify Survey Data	2		27	
	27		Prepare Comp. Programmes	2		28	
	5		Org. Water Assess	2		21	
	21		Assess water, sanit.	3		24	
	24		Draft Water, San. Strat.	3		R7	
	5		Org. Health Suv. Assess	2		22	
	22		Assess Health Services	3		25	
	25		Draft Strat. Hlth. Serv.	3		R7	
	5		Org. Irrig., Drain Assess	2		23	
	23		Assess Irrig., Drain	3		26	
	26		Draft Strat. Irrig., Drain	3		R7	

MAJOR EVENT : FINISH INTERIM STRATEGY

CALCULATION OF REQUIREMENTS : RAHAD ZONE : Major Event: COMPLETE INTERIM STRATEGYPESTICIDES:

Until the interim strategy is implemented an annual spray round for malaria plus larviciding around towns will be continued, and reserves of molluscicides will be built up for the possibility of infestation of the system by snails. The following chemicals will be purchased yearly during this period:

- 40 Metric Tonnes of Malathion
- 300 Gallons of Abate
- 10 Metric Tonnes of Bayluscide

PERSONNEL:

In addition to the snail survey crew which is in readiness for mollusciciding campaign, an annual malaria round requires the following crews:

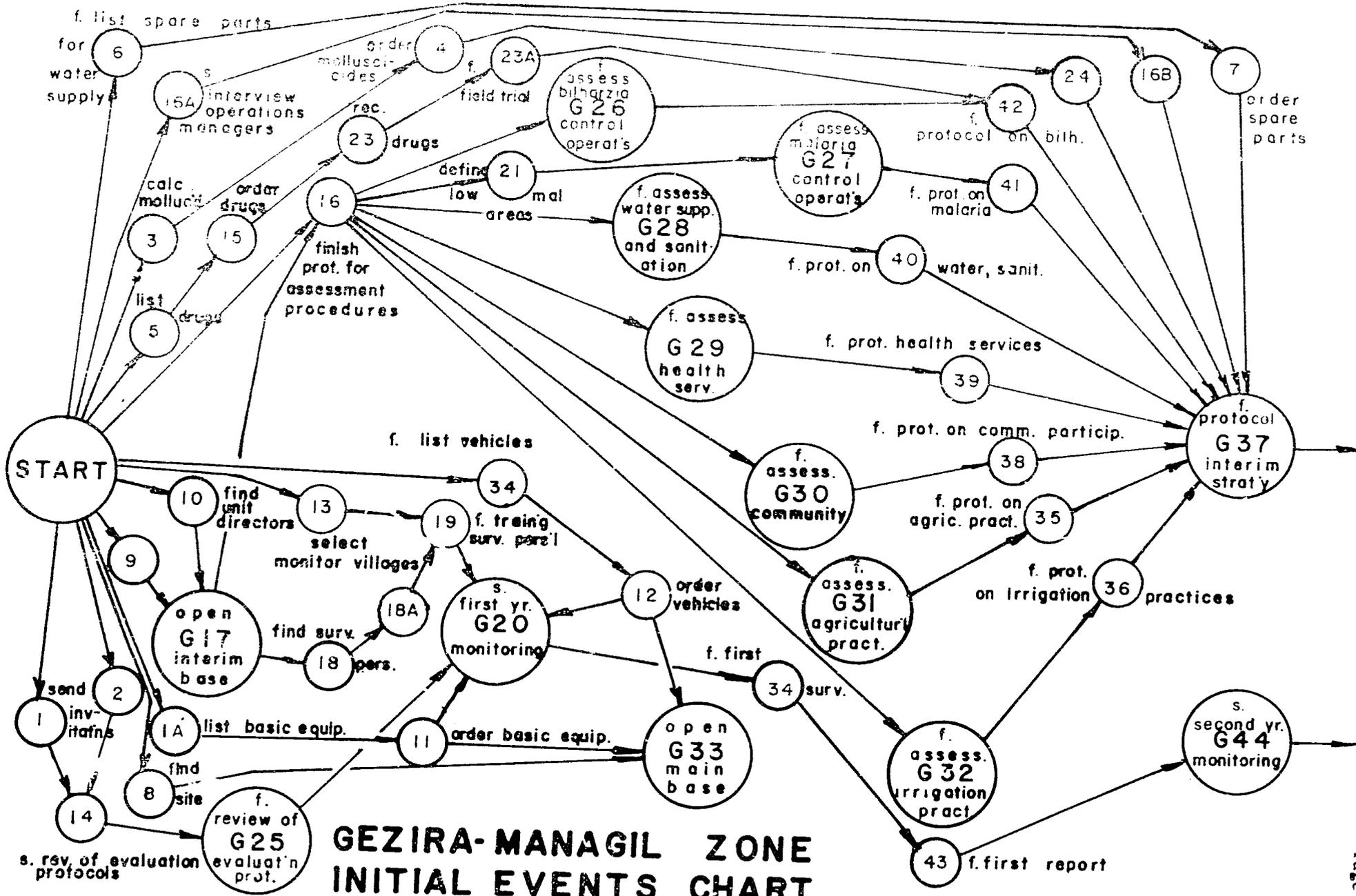
- | | |
|-----------------------------|---------------------|
| - 1 Public Health Inspector | - permanent |
| - 1 Sanitary Overseer | - permanent |
| - 2 Technicians | - permanent |
| - 40 Spraymen | - temporary 1 month |

VII. GEZIRA-MANAGIL ZONE

This Zone is the largest of the 3 zones, including almost 2 million people and 2 million acres. In the first 5 years, following establishment of the Project Headquarters in the Provincial capital at Wad Medani, an Interim Strategy will be gradually initiated, consisting of certain simple but extensive modifications to existing disease control activities. These modifications will include:

- A. Introduction of the new bilharzia drugs
- B. Introduction of the new molluscicide
- C. Rearing and spreading of fish for larval control of mosquitoes
- D. Expansion of chemotherapy of malaria
- E. Repair and Construction of Water Supplies
- F. Improvement of Health Services System
- G. Improvements in Irrigation System (Better communications, weed and silt removal)
- H. Improvements in Agricultural Practices (Mechanical weed removal and more frequent shaping of Abu Eshreens)
- I. Training of Health and Water Supply Personnel
- J. More vehicles for bilharzia programme
- K. Improvement of environmental sanitation

In addition careful assessment will be made of irrigation and agricultural practices to develop long-range improvements to benefit both health and agriculture. Existing efforts directed at weed control and silt removal for the canals will be increased immediately with emphasis on mechanization.



GEZIRA-MANAGIL ZONE INITIAL EVENTS CHART

GEZIRA-MANAGIL ZONE

Act No:	Prev. Event	Start Date	Activity	Month Req'd	Finish Date	Next Event	Unit
	S		Det. Vehicles	1		G3A	
	G3A		Seek Vehicle Funding	8		G12	
	G12		Vehicles on Order	6		G33	
	G3A		Seek borrowed Vehicles	1		G20	
	S		Seek Zone Manager	1		G9	
			Hiring Zone Manager	1		G17	
	S		Seek Unit Directors	7		G10	
			Hiring Unit Directors	1		G17	
	S		Det. Basic Supp., Equip.	6		G1A	
	G1A		Seek Funding B.S. & Eq.	6		G11	
	G11		B.S. & Eq. on Order	6		G33	
	G11		Seek Borrowed B.S. & Eq.	1		G20	
	S		Draft Proposals for				
			Eval. and Strategy	4		2	
	2		Proposals in Mail	1		14	
	14		Select First S.A.G.	1		1	
	1		Invitations in Mail	1		14	
	14		Rev. proposals -Eval.				
			Interim Strategy	1		G25	
	G25		Modify Proposals	1		G20	
	G17		Seek Survey Personnel	5		G18	
	G18		Hiring Survey Personnel	1		G18A	
	G18A		Train Survey Personnel	1		19	
	S		Select 28 Mon. Villages	1		13	
	G19		Orient Villagers	1		G20	
	S		Seek Location Main Base	1		G8	
	G8		Build Main Base	12		G33	
	G17		Move to Main Base	2		G33	

MAJOR EVENT : START MONITORING

CALCULATION OF REQUIREMENTS : GEZIRA-MANACIL ZONE : Major Event:
START MONITORING

HEADQUARTERS:

The first step in the Gezira-Managil Zone is the establishment of Headquarters for the entire project including biology and epidemiology laboratories and data-processing centre. The Units to be accommodated at the Headquarters will require 8 offices for:

- Project Manager and Co-Manager
- Deputy Manager
- Administrative Unit
- Biology Unit (Also three laboratories)
- Epidemiology Unit (Also laboratory facilities)
- Community Unit
- Engineering Unit (Also laboratory facilities)
- Statistical Unit

Also a library, garage and storage building will be needed.

Equipment for these offices and laboratories include:

- 13 Fans
- 8 Typewriters
- 6 Calculators
- 1 Copy Machine
- 1 Stencil Machine
- 3 Telephones
- 1 Radio
- 2 Drafting tables and chairs
- Audio Visual Equipment
- 8 Sets office supplies and stationery
- 4 Air Conditioners (Epid Lab, Manager, Dy. Manager, Library)
- 9 Air Coolers
- 8 Sets Office chairs and tables
- 10 File Cabinets

HOUSING:

Permanent housing for staff and facilities for visitors will be needed as follows:

- 3 Senior Houses
- 5 Middle Houses
- 2 Guest Rooms

The Library will also require purchase of:

- Table and chairs
- Bookshelves
- Card Files
- Books
- Periodicals

The garage and engineering shop will need:

- 1 set Hand Tools
- 1 Welder
- 2 Work benches
- 1 Air compressor
- 1 Hand fuel pump
- 2 Electric Grinders
- 1 Drill Press
- Motor Oil
- Grease

The vehicles required for the HQ staff are:

- 4 Station Wagons
- 3 Pick Ups
- 2 Motorcycles
- 1 Lorry

Office personnel required for administration and Management are:

- 8 Typists
- 4 Clerks
- 2 Messengers
- 2 Sweepers
- 1 Gardener
- 3 Guards

Initially the Malaria operations have sufficient vehicles and equipment. However, the Bilharzia operations must be completely equipped with a total of 1 Station Wagon per 3 areas and 1 for the Bilharzia Operations Officer, 3 Pick-ups in each of 3 areas and 9 Motorcycles for each area, one for each Head Labourer. The individual field men will require bicycles or allowances for donkeys. Thus the vehicle requirements in the interim period, for Bilharzia, are:

- 2 Station Wagons (plus 2 existing)
- 7 Pick-ups (plus 2 existing)
- 27 Motorcycles
- 108 Bicycles
- Lorry (1 existing)

Also they will need:

- 108 Hudson Sprayers
- 27 Scales
- 108 Snail Scoops

EPIDEMIOLOGY LABORATORY:

The following materials are needed for the annual monitoring of 28 villages with about 200 people per village (6 000 people):

- 4 Microscopes etc.
- 5000 Glass Slides and Cover Slips
- 6000 Fecal Containers
- 1000 Urine Containers
- 10,000 Labels
- 10 Glass Markers
- 100 Kato Apparatus
- 10 Hand Centrifuges
- 10 Wash Basins
- Soap and cleaning materials

COMMUNITY UNIT:

This Unit will require audio-visual materials and equipment for use in all 3 Zones:

- 25 Films (5 copies of 5 subjects)
- 2 TV Shorts
- Colour Slides
- Posters
- Pamphlets
- 5 Slide Projectors AC or DC
- 5 Silent Movie Projectors AC or DC
- 2 Sound Movie Projectors AC or DC
- 12 Portable Generators or Batteries
- 2 Loudspeaker systems
- 2 Tape Recorders

BIOLOGY UNIT:

In addition to laboratory furniture and basic laboratory equipment the following equipment is needed for raising of fish:

- 10 Aquaria - 20^L
- 10 Fish Rearing Tanks
- 2 Tank Trucks
- 5 Nets
- 5 Scales

ENGINEERING UNIT:

Local drainage works will be designed by the Engineering Unit, supervising community labour. Basic equipment needed will be:

- 20 Hoes
- 20 Shovels
- 2 Small earth scrapers
- 2 Surveying Transits
- 2 Sets Surveying Equipment

Also monitoring of water supply systems will require:

- 5 Water Meters (Max Cap. 100 cubic meters/day)
- 1 Set Pipe Fitting Tools
- 50 Pressure Gauges
- 50 Flow Meter and Connections (Max Cap 5 cubic meters/day)

Weeding machines will be purchased in combination with the Ministry of Irrigation and Sudan Gezira Board:

- Large Weeding Machines for Canals
- Light Bulldozers
- Small Weeding Machines for Ditches

Screening of kitchens, eating and sleeping areas and latrines will require purchase of screens and door materials:

- Screen materials
- Doors - Wood
- Doors - Hardware

CANAL MAINTENANCE:

The existing programme of manual removal of aquatic weeds from the canals will be gradually replaced with mechanical means, using tractors operating on the banks.

Silt removal operations will be increased in order to rehabilitate all the canals within 3 years. Thereafter, the rate will be reduced to a 5 year cycle.

Act No:	Prev. Event	Start Date	Activity	Month Req'd	Finish Date	Next Event	Unit
	S		Make list of Drugs	1		5	
	5		Seek Funds for Drugs	12		15	
	15		Drugs on Order	6		23A	
	23A		Try Drugs in field	12		23A	
	23A		Evaluate field trial	6		42	
	G17		Orient Unit Directors	1		16	
	S		Prep Prot for Assess	12		16	
	16		Assess Bilharzia Ops	12		G26	
	16		Assess Malaria Ops	12		21	
	21		Find low Malaria areas	12		G27	
	16		Assess Water Supply	12		G28	
	16		Assess Health Services	12		G29	
	16		Assess Community	12		G30	
	16		Assess Agr. Practices	12		G31	
	16		Assess Irrig. Practices	12		G32	

MAJOR EVENT : FINISH ASSESSMENTS

CALCULATION OF REQUIREMENTS : GEZIRA-MANAGIL ZONE : Major Event:
FINISH ASSESSMENTS

DRUGS AND PESTICIDES:

For the interim strategy the present funds devoted to purchase of molluscicides will be used to purchase Bayluscide. Some additional drugs will be needed for distribution in conjunction with villages cooperating in the community programme. This will involve annual purchases of the following:

- 136 Metric Tonnes Malathion
- 2.4 Metric Tonnes Abate
- 50 Metric Tonnes Fenitrothion
- 7 Metric Tonnes Bayluscide
- 40000 GMS. Oxamiquine
- 4000 GMS. Metrifonate
- 10000 Packets of Oralyte

MICROSCOPISTS:

As part of the expansion of the Malaria case detection system, microscopists will be trained and deployed in local health units throughout the Zone, at an initial annual rate of :

- 50 Microscopists

Act No:	Prev Event	Start Date	Activity	Month Req'd	Finish Date	Next Event	Unit
	S		List Spare Parts Water	2		6	
	6		Seek Funds Spare Parts	12		7	
	7		Spare Parts on Order	6		G37	
	S		Calc.Molluscicides	1		3	
	3		Seek Funds Molluscicide	12		4	
	4		Molluscicides on Order	6		24	
	G26		Dev.Protocol Bilharzia	2		42	
	42		Integrate Bilharzia Prot	1		G37	
	G27		Dev. Protocol Malaria	1		41	
	41		Integrate Malaria Prot.	1		G37	
	G28		Dev. Prot. Water Supply	2		40	
	40		Integrate W.S. Protocol	1		G37	
	G29		Dev.Prot.Health Service	2		39	
	39		Integrate Hlth Svcs Prot	1		G37	
	G30		Dev. Prot.Commun.Part.	2		38	
	38		Integr.Commun.Protocol	1		G37	
	G31		Dev.Agric Pract. Prot.	2		35	
	38		Integr.Agric.Pract Prot	1		G37	
	G32		Dev.Irrig.Pract.Prot	2		36	
	36		Integr.Irrig.Pract Prot	1		G37	
	G20		Conduct 1st Survey	2		34	
	34		Analyse 1st Survey	1		43	
	43		Improve Survey Proced.	1		G44	

MAJOR EVENT : FINISH PROTOCOL OF INTERIM STRATEGY

CALCULATION OF REQUIREMENTS : GEZIRA-MANAGIL ZONE : Major Event :
FINISH INTERIM STRATEGY

WATER SUPPLY:

A major activity in the first five years in this Zone will be improvements in the existing water supply system, both in training of village plant operators and in purchase of spare parts. A second major activity will be construction of new systems, a major capital expense, to be handled by contracts, starting after 1981.

Annual needs in the first 3 years will be:

- Spare parts to repair systems
- Training of village pump operators

VIII. THE STUDY ZONE

The Study Zone includes 50 000 to 100 000 people in Blocks 26 and 27 of the Mehereiba Council, about 50 000 acres just north of Hassa Heisa.

Activities in this Zone will establish the scientific validity of the Comprehensive Strategy and will quantitatively determine its cost and its benefits. Thus preparations will be very thorough and quality of work will not be sacrificed in the interest of speed.

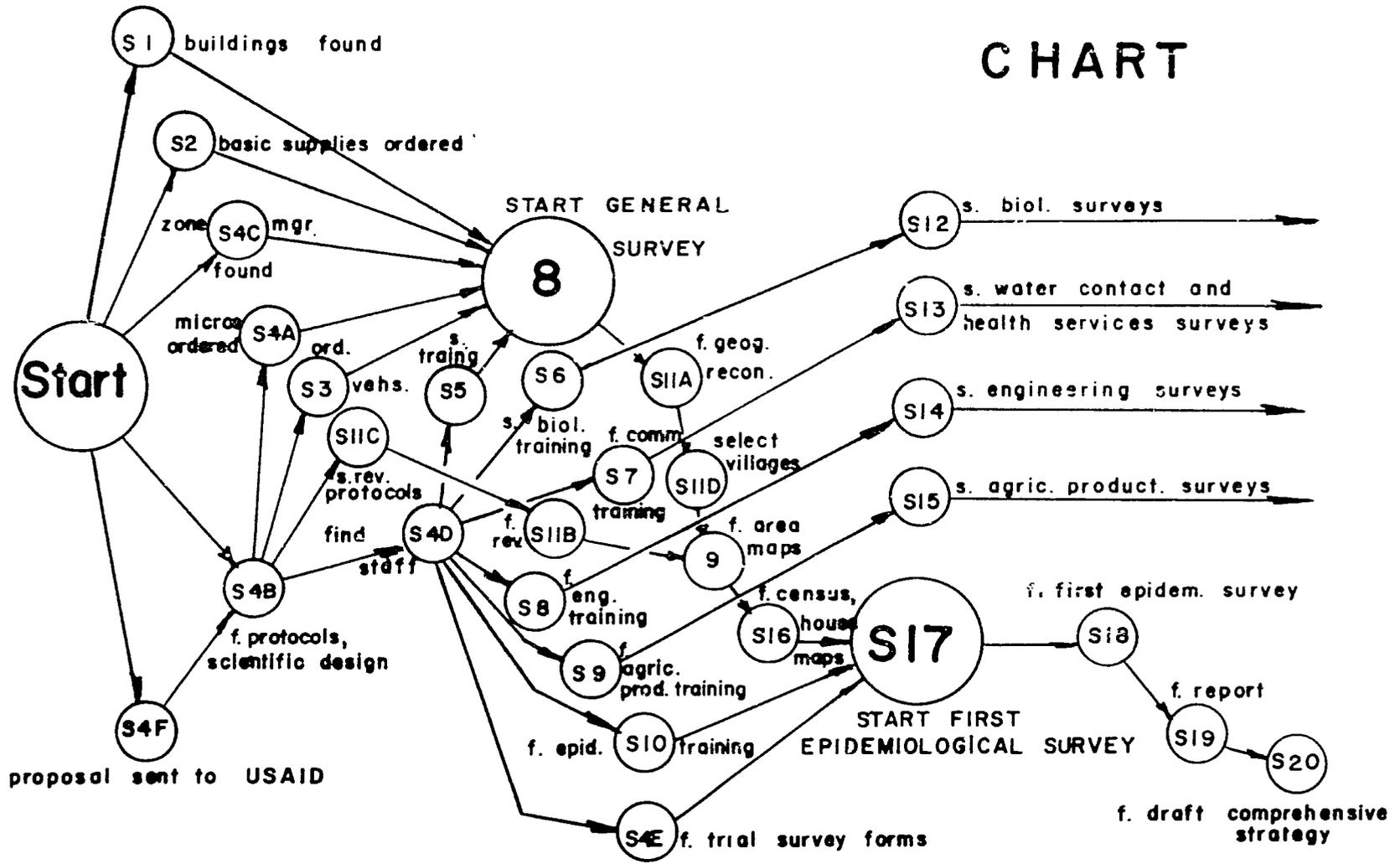
At least a year of pre-intervention studies will establish the existing patterns of bilharzia transmission, and the present status of malaria and diarrhoeal disease. Then a 3 year trial of the Comprehensive Strategy will be carried out throughout Blocks 26 and 27 while Comparison Areas are monitored outside the Blocks to establish the effect of the intervention.

A complete evaluation after 5 years will be the basis for expanded coverage of the Comprehensive Strategy to the other 2 Zones.

STUDY ZONE

INITIAL EVENTS

CHART



Act No:	Prev. Event	Start Date	Activity	Month Req'd	Finish Date	Next Event	Unit
	S		Obtain Buildings	0.1			
	S1		Improvements	4.4		S1 8	
	S		Prepare Proposal USAID	4.5			
	S4B		USAID Process Grant	2.0		S4B S4B	
	S		Search for Zone Manager	0.1			
	S4C		Hire Zone Manager	1.0		S4C 8	
	S		Establish Survey Prot.	4.5		S4B	
	S		Calc. Basic Supp. & Equip	0.1			
	S2		Basic Supp. & Eq. on Order	3.0		S2 8	
	S4b		List Vehicles	0.1			
	S3		Vehicles on Order	6.0		S3 8	
	S4B		List Microscopes	0.1		S4A	
	S4A		Microscopes on Order	3.0		8	
	S4B		Search for Surv. Personnel	1.0		S4D	
	S4D		Hire Surv. Pers.	1.0		S5-10	
	S4B		Write Survey Forms	0.5		S4E	
	S4E		Print Survey Forms	1.0		S17	
	S5		Train Surv. Map. Pers.	0.1		8	
	S4B		Protocols to 1st SAG	1.0		S11C	
	S11C		Prot. review by 1st SAG	1.0		S11B	

MAJOR EVENT : START GENERAL SURVEYS

CALCULATION OF REQUIREMENTS : STUDY ZONE : Major Event:
START GENERAL SURVEYS :

BUILDINGS:

Because of the intensive nature of the work in the first 5 years, a fairly large Field Base is required at Abu Usher. It will include:

- 2 Offices (Zone Manager, Epidemiologist)
- 1 Laboratory for biology
- 1 Senior house for Epidemiologist
- 2 Junior Houses for staff
- 2 Guest rooms for visitors

Basic equipment for the offices and laboratories is needed:

- 1 Telephone
- 1 Radio
- 2 Desks and chairs
- 1 Refrigerator
- 1 Autoclave
- 2 Laboratory Benches and chairs
- 1 Typewriter
- 1 Set office supplies
- 1 Set Glassware
- Bunsen Burners
- Butagas
- Electricity Supply
- Water Supply

The first steps in general surveys will be preparation of maps, selection of villages, census and selection of household samples. Then annual prevalence surveys will start and monitoring of biology, human activities, agricultural productivity and water supply and sanitation. This will require the following teams:

DIAGNOSTIC TEAM:

- 1 Clinician
- 6 Microscopists to do 25 000 Slides/year
 $(50\ 000\ \text{People} \times \frac{20}{40}\ \text{villages} \times 20\% \text{ sample} = 5\ 000\ \text{people})$
 3 Fecal Slides + 1 Urine Slide + 1 Malaria = 5 slides
- 3 Laboratory Attendants
- 2 Public Health Officers

MAPPING AND WATER SUPPLY MONITORING (FULL TIME 1980, HALF-TIME AFTER)

- 1 Engineer
- 5 Eng. Assistants

BIOLOGY: (HALF-TIME)

- 1 Biologist
- 5 Biol. Assistant

PRODUCTIVITY: (HALF-TIME)

- 1 Economist
- 5 Observer-Enumerators

BEHAVIOUR:

- 1 Sociologist
- 5 Observers

VEHICLES:

In addition to a Pick-up for the Zone Manager, a Station Wagon will be required for the Diagnostic Team with another Pick-up for the Clinician. Then also 2 Station Wagons will be shared by the other 4 Teams:

- 2 Pick-ups
- 3 Station Wagons

LABORATORY DIAGNOSTIC EQUIPMENT:

For 5 000 people or 25 000 slides, the following will be needed:

- 5 000 Fecal Containers
- 1 000 Urine Containers
- 5 000 Urine Filters
- 100 Syringes
- 10 Hand Centrifuges
- 10 Kato Apparatus
- 100 Sieves - 150 ~~µ~~M Mesh
- Needles
- Detergent
- Glass-washing equipment
- Glass Markers
- Labels
- Census Forms for 20 Villages
- Diagnostic Forms for 5 000 People

STUDY ZONE

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Act No.	Prev. Event	Start Date	Activity	Month Req'd	Finish Date	Next Event	Unit
	S11B		Modify Prot & Sc Design	0.1		9	
	S6		Train Biology Personnel	0.5		S12	
	S7		Train Community Pers	0.5		S13	
	S8		Train Eng. Personnel	0.5		S14	
	S9		Train Eval. Personnel	0.5		S15	
	S10		Train Epid. Personnel	0.5		S17	
	8		Make General Map	0.5		S11A	
	S11A		Select Village Areas	0.1		S11D	
	S11D		Make 20 Area Maps	1.0		9	
	9		Make House Maps, Do Census	1.0		S16	
	S16		Select Pop. Sample	0.1		S17	
	5		Add Biol. detail to Area Maps	0.5		S12	
	9		Add Community Detail	0.5		S13	
	9		Add Eng. Detail	0.5		S14	
	9		Add Productivity Detail	0.5		S15	

MAJOR EVENT : START BASE-LINE SURVEYS

CALCULATION OF REQUIREMENTS : STUDY ZONE : Major Event :
START BASE-LINE SURVEYS

INTENSIVE HEALTH EXAMINATION:

In 3 of the villages a complete medical examination of the sample population will be made requiring the following:

- 1 Clinician
- 1 Microscopist
- 3 Assistants

- 1 Mobile laboratory
- Clinical Diagnostic Equipment
- Laboratory Supplies

IX. RESEARCH AND TRAINING

A. Operationally oriented research:

Individual short-term investigations will address many of the technical questions unanswered at the initiation of this Project. These questions bear directly on operations, and are grouped by disease, on the following pages.

B. Training:

Local training will be extensive in the first year as new personnel are hired. It will continue throughout the 10 years of the Project.

International Seminars will be organized annually to inform planners and public health personnel of the Project's findings and experience.

MALARIA APPLIED RESEARCH ACTIVITIES:

1. Periodic tests for chloroquine resistance of P. Falciparum.
2. Trials of new malaria drugs.
3. Trials of serological malaria tests.
4. Clarify Malathion resistance of An. Arabiensis.
5. Evaluate dry season larviciding with Abate or others.
6. Improve larval sampling procedures.
7. Laboratory trials of safe biological agents against Anopheles.
8. Test sampling methods for Gambusia.
9. Evaluate other larvivorous fish.
10. Investigate new biological agents against Anopheles.
11. Identify species of An. Gambiae complex in Rahad.
12. Determine human blood index for Anophelines in Gezira and Rahad.
13. Trial of new method for sporozoite detection.

BILHARZIA APPLIED RESEARCH:

1. Evaluate total impact of disease control on community well-being and productivity.
2. Develop simple models of disease transmission for cost-effective analysis.
3. Determine ethnic requirements for health education: seasonal labourers, registered villages, unregistered villages, and isolated families.
4. Assess available serological techniques to reduce workload: COP, RIA
5. Determine origin and transmission potential of Rahad seasonal labourers.
6. Pilot testing of innovative control methods: biological, water management, drug delivery systems, plant molluscicides and larvicides, sanitation facilities, recreation facilities, public showers, migrant camp situation, and protected canal sections for swimming.

DIARRHOEAL DISEASE APPLIED RESEARCH:

1. Determine frequency and duration of episodes.
2. Determine weight gains in controlled versus uncontrolled communities.
3. Evaluate acceptance of Oralyte for each ethnic group.
4. Evaluate screens for fly control.

X. COORDINATION

The National and International Boards will annually review plans and proposed budget. A Scientific Advisory Group will also meet annually to assist the Project Senior staff. The membership of these Boards will be as follows:

A. International Review Board:

Financial Donor Agencies
U.N. Organizations

B. National Coordinating Board:

Ministry of Health
Ministry of Irrigation
Sudan Gezira Board
Rahad Development Corporation
Ministry of Energy and Mining
Universities of Khartoum and Gezira
Tenants' Union
Other Ministries

C. Scientific Advisory Group:

Malaria Expert
Bilharzia Expert
Diarrhoeal Disease Expert
Expert Statistician
Management Expert
Community Participation Expert
Water Supply Expert

XI. REPORTING

The rapid dissemination of plans and results from this project, in arabic and english, will be a basic activity of the Project Senior Staff, for which they will be held strictly accountable. To meet this requirement the following services and report series will be established early in the Project:

- A. Codification and Computer Analysis of Data.
- B. Typing, Translation and Printing Service.
- C. Editorial Review Group.
- D. Blue Nile Health Project Report Series:
 - 1. Data Records
 - 2. Annual Reports
 - 3. Research Reports
 - 4. Project Scientific Reports

In addition, the Scientific Staff will be mutually supported by regular and constructive criticism, in the publication of research results in local and international scientific journals.