

CATCHMENT MANAGEMENT AND POVERTY ALLEVIATION



**THE ROLE OF ECONOMIC
INSTRUMENTS AND COMPENSATION
MECHANISMS IN WATER RESOURCE
AND FOREST MANAGEMENT**

FORESTRY RESEARCH PROGRAMME

TANZANIA CASE STUDY

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HISTORICAL BACKGROUND OF WATER RESOURCE MANAGEMENT IN TANZANIA

The Period before 1888

- **Indigenous Technological Innovations were used**
- **Examples include the following.**
 - (i) Matengo (Ngoro) pits farming system in Songea, Southern Tanzania.**
 - (ii) Mound cultivation system in Ufipa, South-west Tanzania**
 - (iii) Home gardens farming system in Kilimanjaro, North-East Tanzania**

(ii) The period 1888-1920

The country (then Tanganyika) was under German Rule

- **The principle of catchment forest was introduced**
- **Aim was to protect water catchment areas**
- **A total area of 5200 km² stretching from *Mbulu* (Arusha) to *Mbeya* was protected.**

(iii) The period 1920 - 1961

The Country was under British Rule

- **Work started by the Germans was further promoted**
- **More protection measures were instituted among**
which include:

(i) Protection against cultivation on steep slopes

(ii) Protection of water courses and sources of water

(iii) Control of burning (bush fires)

(iv) Introduction of cover crops

(v) Closure of steep slopes for cultivation

• **Demonstration plots to control soil erosion in mountainous areas (Kilimanjaro, Pare, Meru) were implemented.**

• **Education campaigns on soil conservation methods were implemented**

• **Territorial Rules and regulations were enacted to make sure the measures were implemented. Examples include the National Land Usage Schemes of Sukumaland, Usambara Mountains and Uluguru Mountains**

NB: The measurement were very effective in protecting water catchments in country



(iv) The period 1961 - 1968

- This period (post-independence) is characterized by relaxation and collapse of the Rules and Regulations that were in existence before independence
- Serious land degradation occurred in many parts of the country e.g Kondoia Eroded Area in Central Tanzania
- Several catchment forests were converted to cultivation e.g 1200ha of Juniperus forest in west Usambara were excised from reservation

(v) The period 1968 - to date

The Government “Woke up” and noted the seriousness of catchments degradation

Several measures were formulated/implemented

Examples included

- (i) Implementation which incorporated into its Year Development Plans*
- (ii) Implementation of various projects in the affected areas e.g*

***HADO**-Hifadhi Ardhi Dodoma(Soil conservation in Dodoma Region*

***HASHI**-Hifadhi Ardhi Shinyanga(Soil conservation in Shinyanga Region*

***SECAP**-Soil Erosion Control and Agroforestry Project - Lushoto Tanga Region*

***SCAPA**-Soil Conservation and Agroforestry Project - Arusha*

***LAMP**-Land Management Programme - Babati, Arusha*

(iii) Formation of various national and parastals bodies to be directly or indirectly responsible on conservation of water catchments /river basins e.g

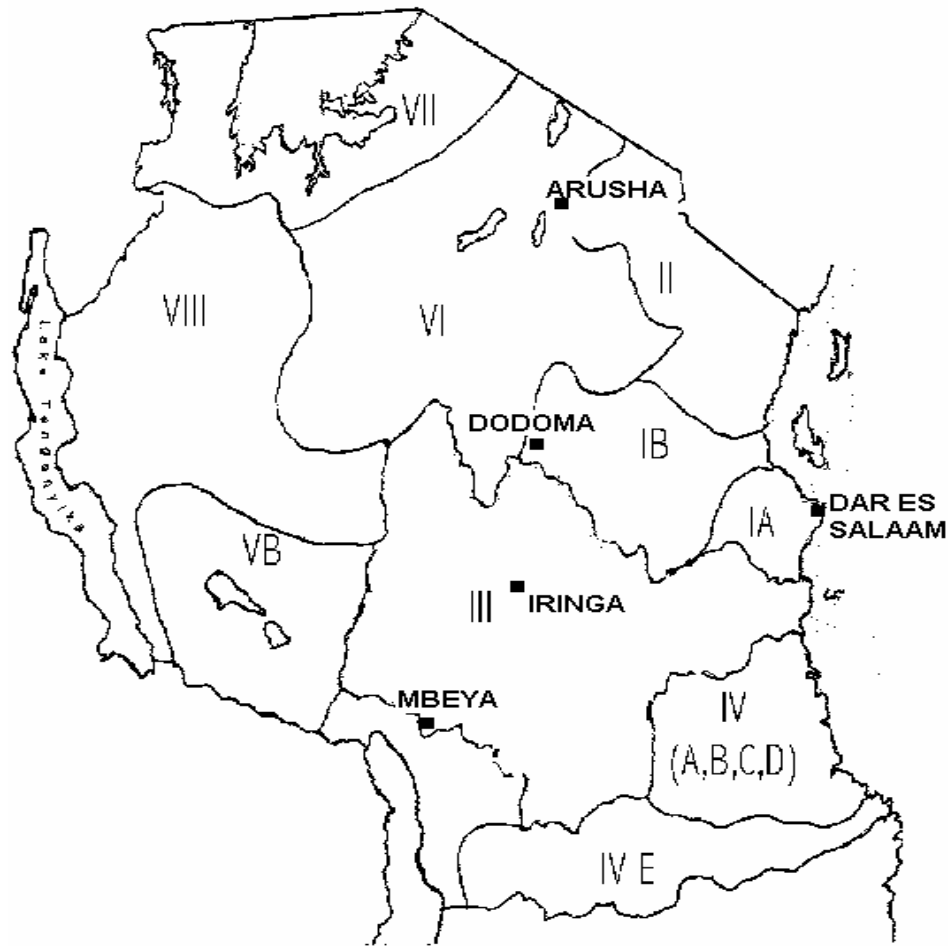
RUBADA-Rufiji Basin Development Authority

NEMC-National Environmental Management Council

NLPC-National Land Use Planning Commission

KBDA-Kagera Basin Development Authority

RIVER BASINS IN TANZANIA



IA RUVU RIVER

IB WAMI RIVER

II PANGANI RIVER

III RUFJI RIVER

IVA MATUNDU RIVER

IV B MUVUDJI RIVER

IV C MBWEMKURU RIVER

IV D LUKULEDI RIVER

IV E RUVUMA RIVER

VA LAKE NYASA BASIN

VB LAKE RUKWA BASIN

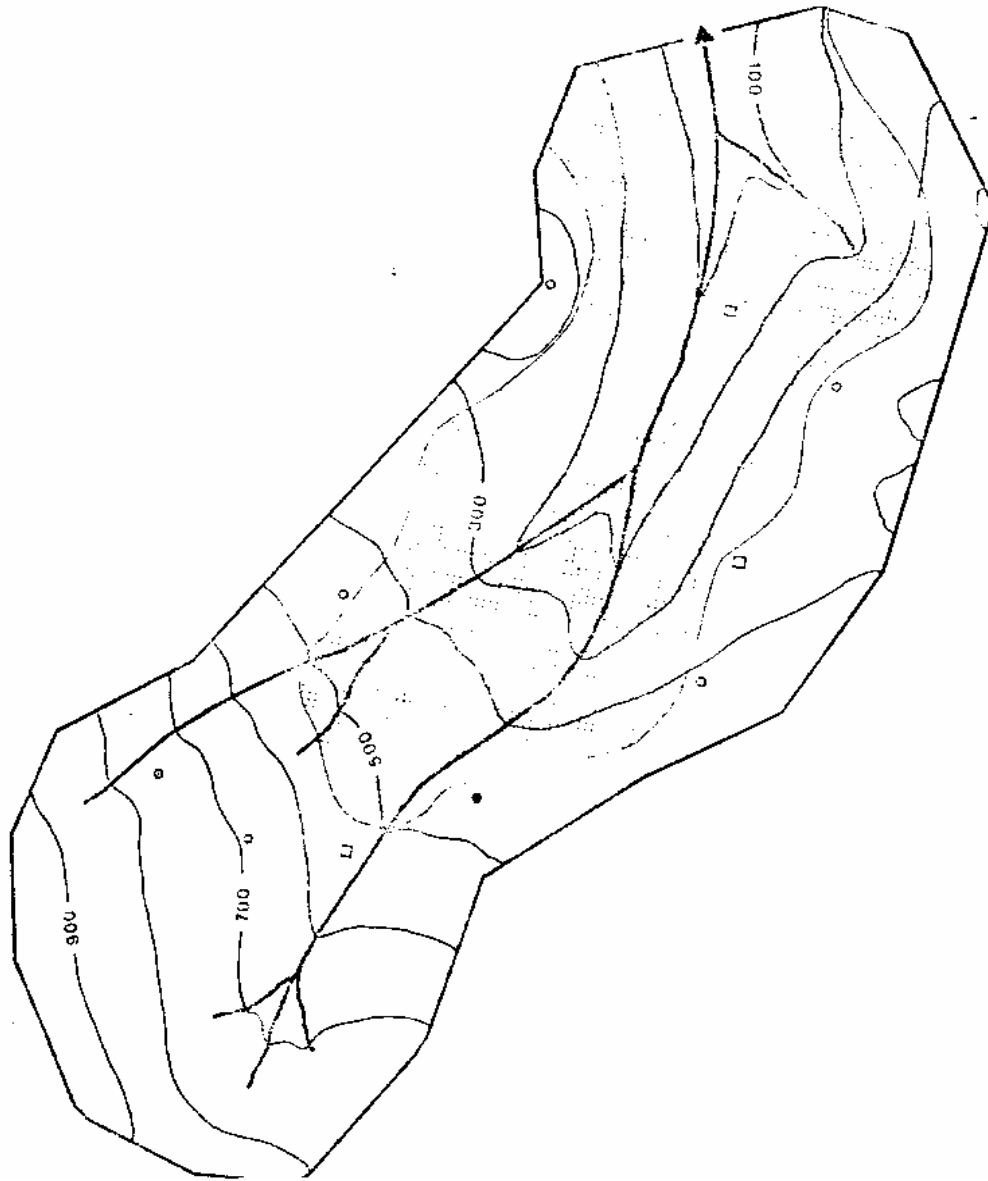
**VI INTERNAL DRAINAGE BASIN
(LAKE EYASI, MANYARA, NATRON
AND BAHU DEPRESSION)**

VII LAKE VICTORIA

VIII LAKE TANGANYIKA BASIN

FOREST IN TANZANIA: TYPE, USE, LEGAL STATUS AND COVERAGE

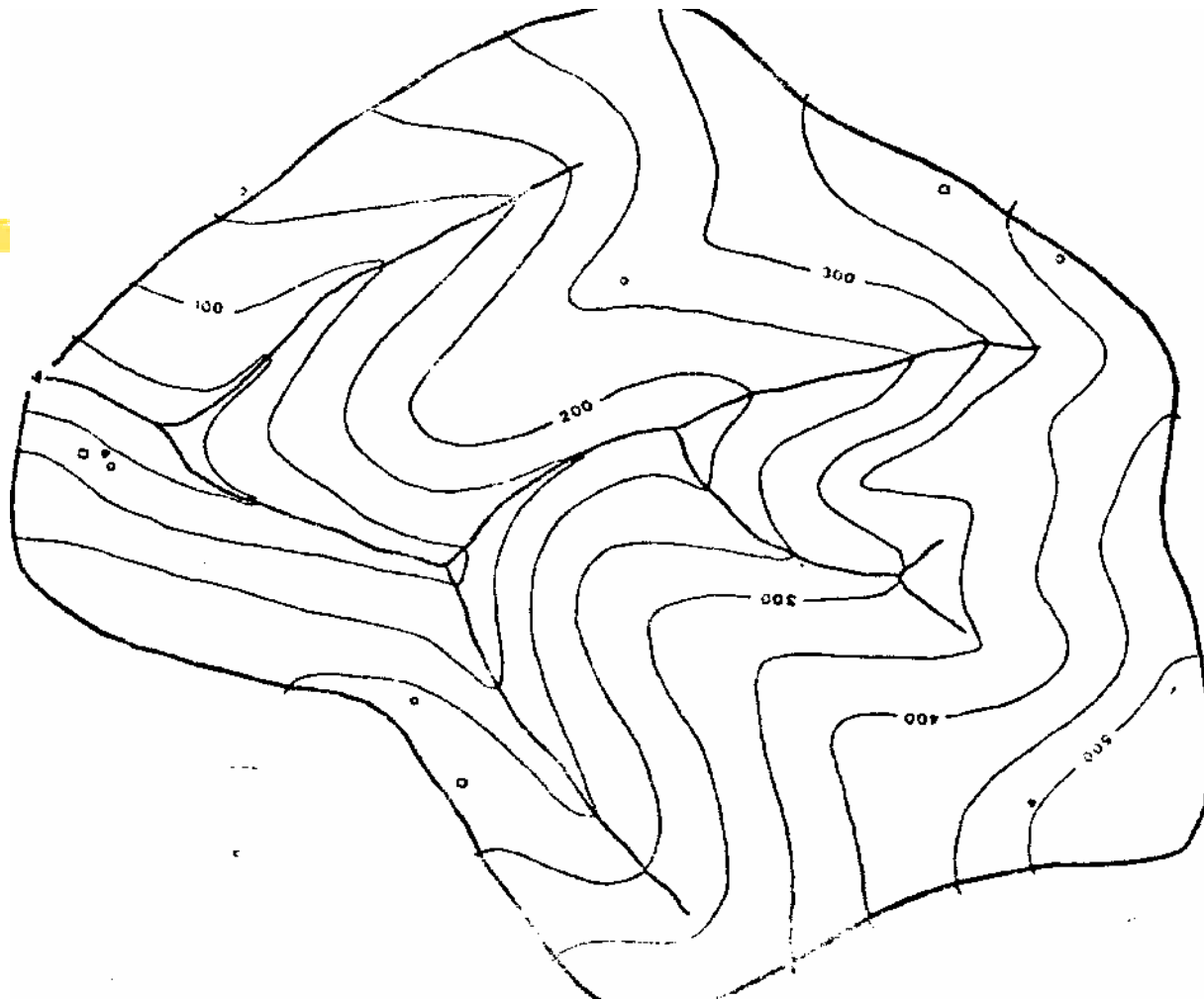
Forest Type	Area (000ha)
Forests (other than mangrove forests)	1141
Mangrove forest	115
Use of Forest Land	
Production forest area	23810
Protection forest area (mostly catchment areas)	9745
Legal Status	
Forest reserves	12517
Forest/Wood lands within national parks, game reserves	2000
Non-reserved forest land	19038



MBEYA: FORESTED CATCHMENT

UNADJUSTED WATER BALANCE: MBEYA FOREST CATCHMENT C

Catchment C	R	Q	ΔS	ΔG	AE	EO	AE/EO
10.58–10.659	1421	214	+18	0	1189	1722	0.69
10.659–7.660	2043	564	-61	+70	1470	1526	0.96
7.660–29.661	1332	330	+2	-70	1070	1773	0.60
29.661–5.662	2753	842	+42	+85	1784	1406	1.27
5.662–5.663	1878	534	-34	-27	1405	1453	0.97
5.663–6.664	2199	652	+4	+27	1516	1481	1.02
6.664–11.665	1512	446	0	-39	1105	1482	0.75
11.665–10.666	2013	564	0	+12	1437	1380	1.04
10.666–10.667	1681	453	0	0	1228	1435	0.86
10.667–11.7.68	2404	814	0	-20	1610	1442	1.12
Mean, 1958-68	1924 ₊₁₄₃	541 ₊₆₂	-3 ₊₉	4 ₊₁₅	1381 ₊₇₃	1510 ₊₄₂	0.91 _{+0.06}

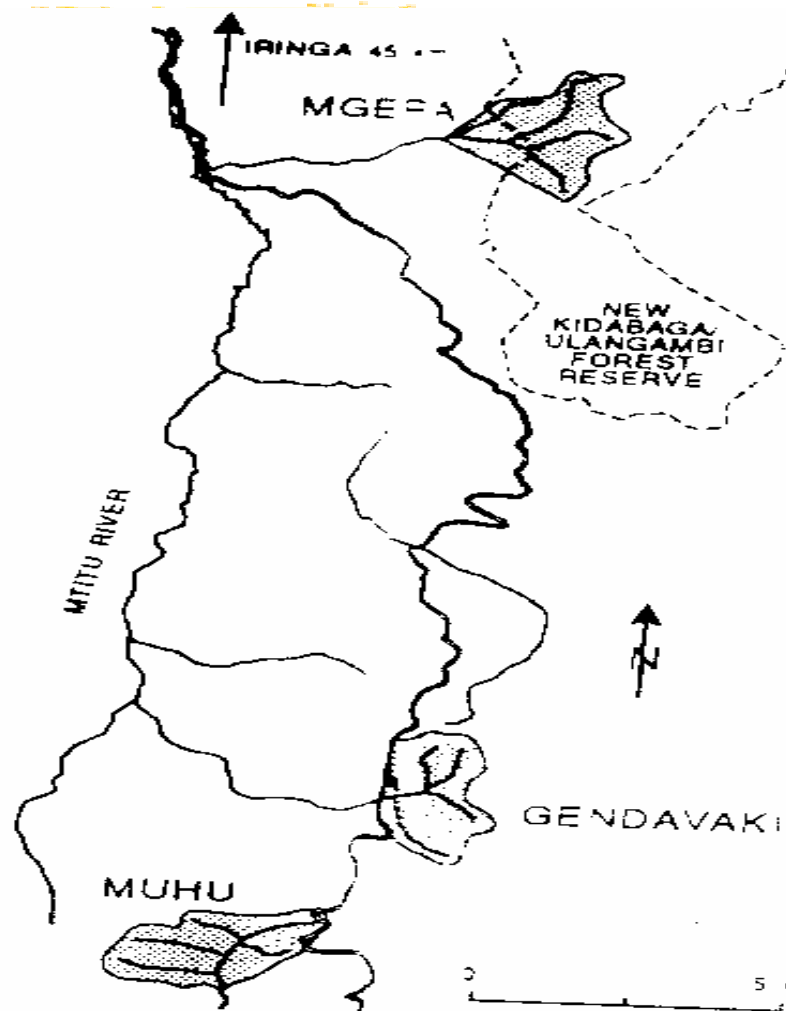
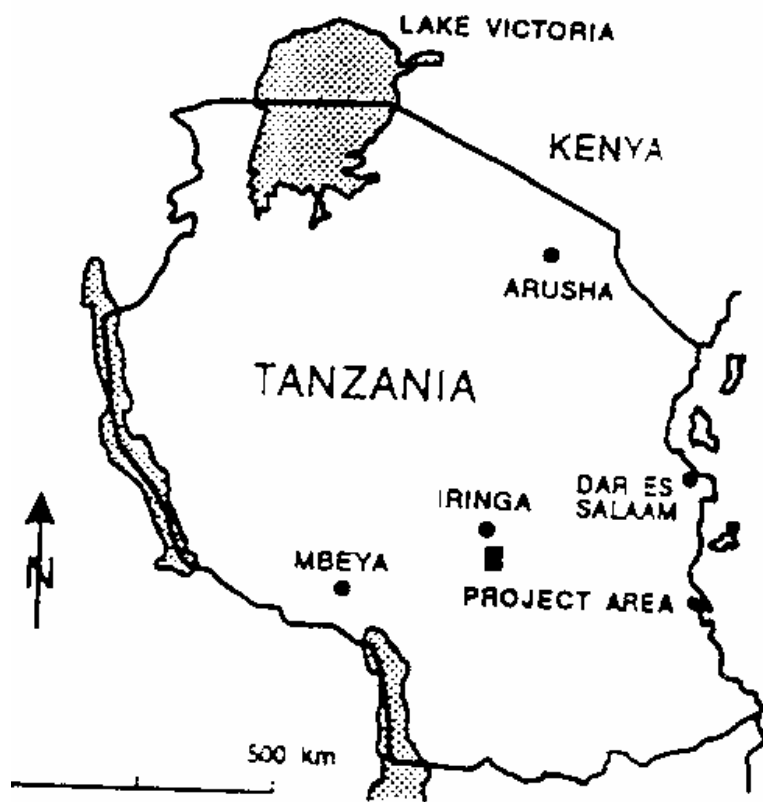


MBEYA: CULTIVATED CATCHMENT A

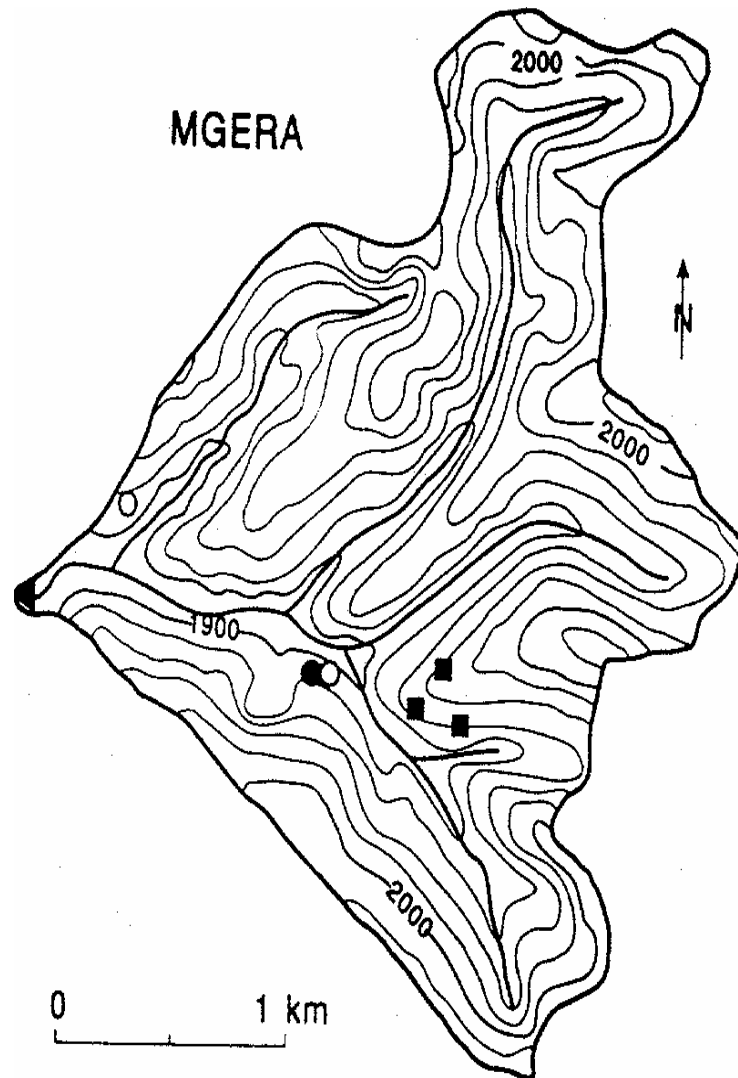
UNADJUSTED WATER BALANCE: MBEYA CULTIVATED CATCHMENT

Catchment A period	R	Q	ΔS	ΔG	AE	EO	AE/EO
21.6.58 – 21.6.59	1308	358	0	-75	1025	1748	0.59
21.6.59 – 11.6.60	1730	497	+33	+131	1069	1496	0.71
11.6.60 – 11.6.61	1181	457	-29	+112	865	1675	0.52
11.6.61 – 11.7.62	2257	1044	+11	+212	990	1636	0.60
11.7.62 – 11.6.63	1546	643	+38	-100	965	1329	0.73
11.6.63 – 11.6.64	1901	792	+11	+124	974	1473	0.66
11.6.64 – 11.6.65	1369	556	+21	-160	952	1465	0.65
11.6.65 – 10.6.66	1485	494	-58	0	1049	1380	0.76
10.6.66 – 10.6.67	1528	476	+29	+18	1005	1435	0.70
10.6.67 – 11.7.68	2276	1296	-13	+167	826	1442	0.57
Mean 1958 68	1658 _± 120	666 _± 94	_± 4 _± 10	_± 20 _± 42	972 _± 24	1508 _± 42	0.64 _± 0.02

MGERA, GENDAVAKI AND MUHU CATCHMENTS



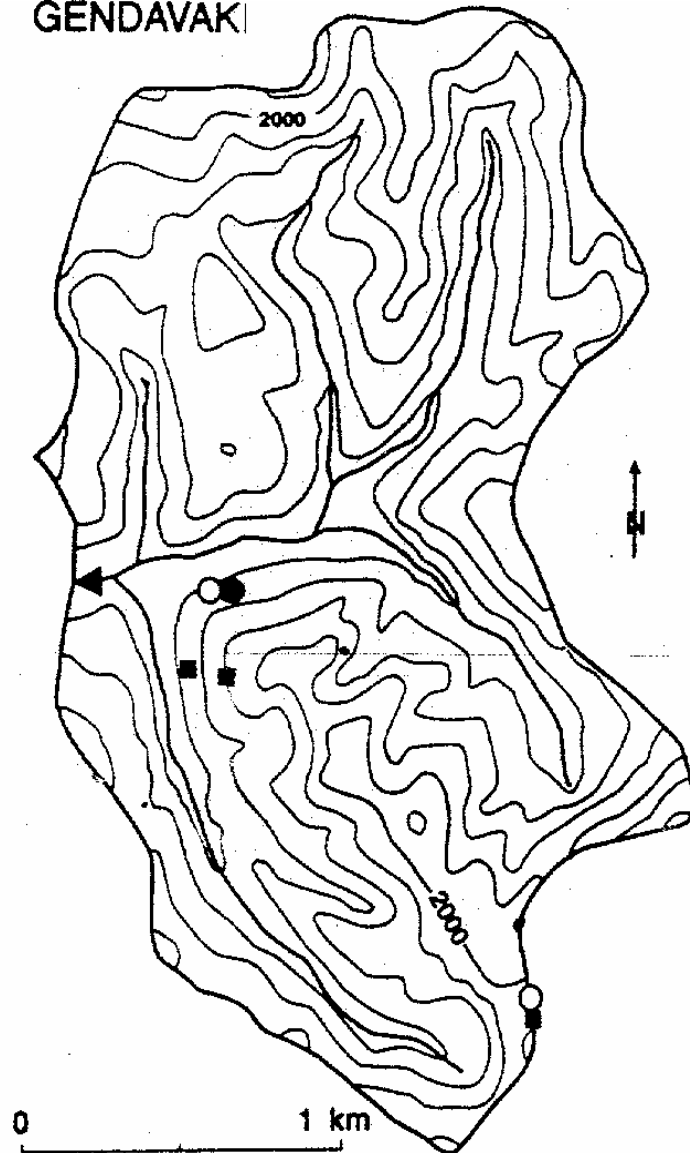
Some Physical Characteristics of *MGERA*



Characteristic	Catchment
	Mgera
Size (km ²)	5.16
Altitude (m asl)	1958
Average slope (%)	20-30
Drainage density	1.93
Stream order	3
Geology (bedrock)	Metamorphic
Soil group (FAO)	Axrisol
Soil order (USDA)	Ultisol
Prevailing soil textural class	Clay

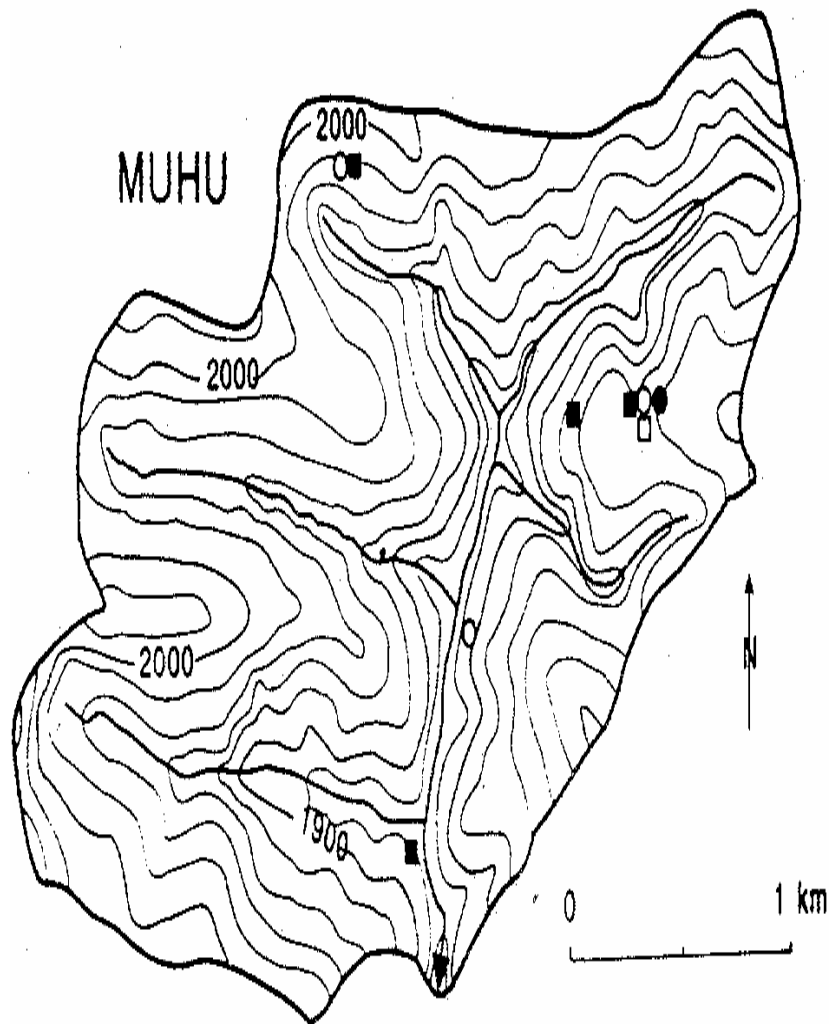
Some Physical Characteristics of *GENDAVAKI*

GENDAVAKI



Characteristic	Catchment
	Gendavaki
Size (km ²)	4.48
Altitude (m asl)	1959
Average slope (%)	20-30
Drainage density	1.75
Stream order	3
Geology (bedrock)	Metamorphic
Soil group (FAO)	Acrisol
Soil order (USDA)	Ultisol
Prevailing soil textural class	clay

Some Physical Characteristics of *MUHU*



Characteristic	Catchment
	Muhu
Size (km ²)	4.87
Altitude (m asl)	1951
Average slope (%)	20-30
Drainage density	1.98
Stream order	2
Geology (bedrock)	Metamorphic
Soil group (FAO)	Acrisol
Soil order (USDA)	Ultisol
Prevailing soil textural class	Clay

WATER BALANCE: *MGERA, GENDAVAKI AND MUHU*

Period	Catchment	Water balance components (mm)					
		P	Q	ΔS	ΔG	Ea	Q/P
1993-94	Mgera	1302	280	-2	10	1014	0.22
	Gendavaki	1261	435	1	12	813	0.34
	Muhu	1155	398	6	29	722	0.34
1994-95	Mgera	962	216	4	-17	759	0.22
	Gendavaki	1240	398	-9	-14	865	0.32
	Muhu	1101	369	-10	-33	775	0.34
1995-96	Mgera	1197	251	1	9	936	0.21
	Gendavaki	1486	489	9	71	917	0.33
	Muhu	1257	388	5	41	823	0.31
1993-96 Average values	Mgera	1154	249	1	1	903	0.22
	Gendavaki	1329	441	1	23	864	0.33
	Muhu	1171	385	1	12	773	0.33



MGERA (FORESTED)



GENDAVAKI (CLEARED)



MUHU (CLEARED)

PROPOSED FRP SITES AND JUSTIFICATION

SITE 1: MUHU CATCHMENT

- Why?**
- *CULTIVATED HIGHLAND*
 - *DEVELOPED DATABASE*
 - *AGRICULTURE IS PRIMARILY RAINFED*

SITE 2: KIMANI CATCHMENT

- Why?**
- *DECLINING OF FLOWS IN GREAT RUAHA RIVER*
 - *UNCULTIVATED AND ALSO UNIQUE: UPPER PART IS GRASS LAND, MIDDLEPART IS MIOMBO WOODLANDS (FOREST), LOWER PART (PLAINS) CULTIVATED*
 - *NO MUCH AGRICULTURAL PRACTICES IN UPPER SLOPES*
 - *ON GOING PROJECTS SUCH AS SMUWC, SRMP, RIPARWIN*
 - *DEVELOPED DATABASE*

THANKS

