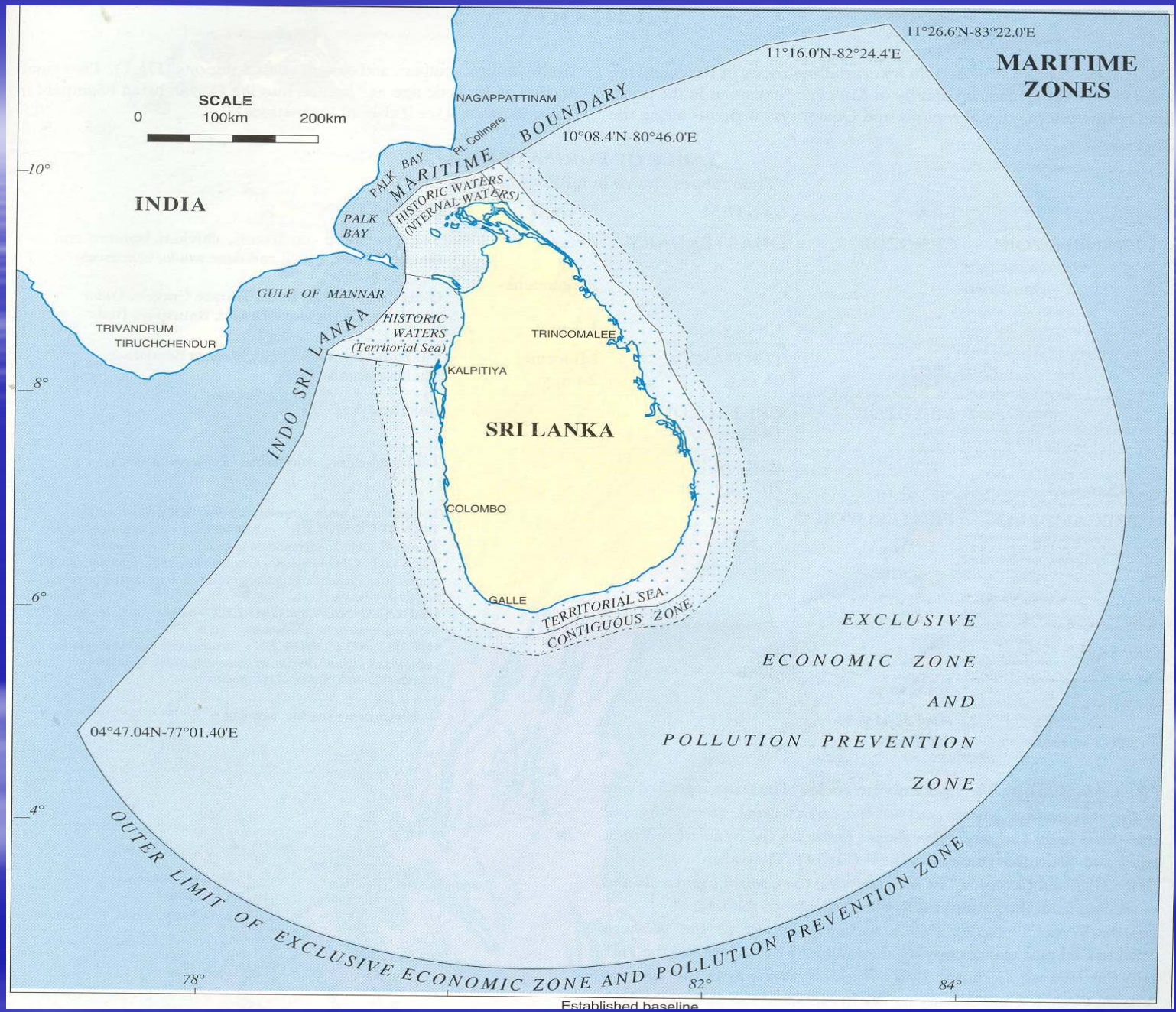
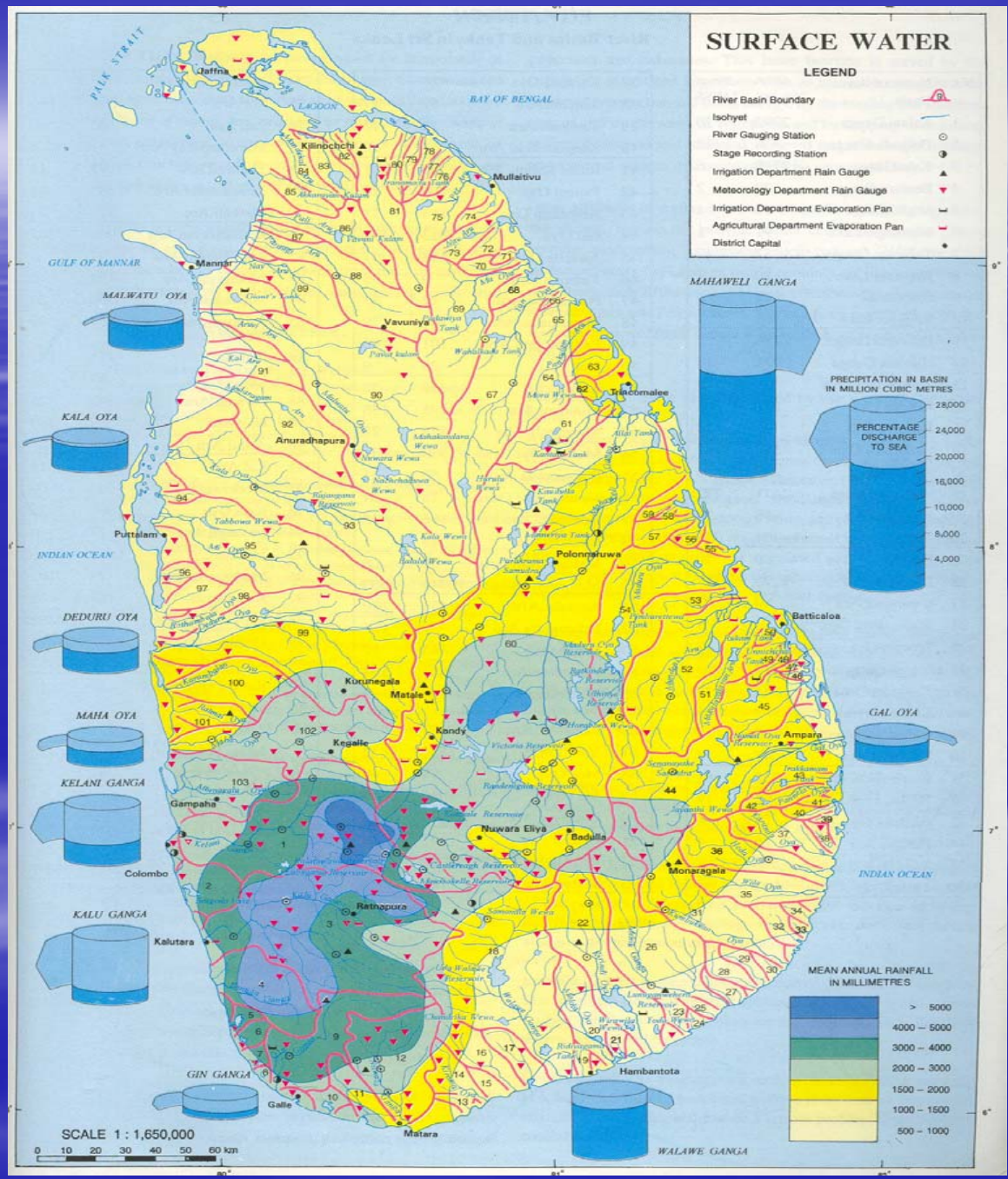
Sri Lanka
Rainwater harvesting

Why Sri Lanka should concentrate on Rainwater Harvesting

I.DISSANAYAKE

SRI LANKA


MARITIME ZONES
SCALE
0 100km 200km
INDIA
SRI LANKA
NAGAPPATTINAM
Pt. Calimere
PALK BAY
MARITIME BOUNDARY
11°26.6'N-83°22.0'E
11°16.0'N-82°24.4'E
10°08.4'N-80°46.0'E
HISTORIC WATERS (INTERNAL WATERS)
PALK BAY
GULF OF MANNAR
INDO SRI LANKA
HISTORIC WATERS (Territorial Sea)
TRINCOMALEE
KALPITIYA
COLOMBO
GALLE
TERRITORIAL SEA
CONTIGUOUS ZONE
TRIVANDRUM
TIRUCHCHENDUR
EXCLUSIVE ECONOMIC ZONE AND POLLUTION PREVENTION ZONE
04°47.04N-77°01.40'E
OUTER LIMIT OF EXCLUSIVE ECONOMIC ZONE AND POLLUTION PREVENTION ZONE
10°
8°
6°
4°
78°
82°
84°
Established baseline


SURFACE WATER
LEGEND
River Basin Boundary
Isohyet
River Gauging Station
Stage Recording Station
Irrigation Department Rain Gauge
Meteorology Department Rain Gauge
Irrigation Department Evaporation Pan
Agricultural Department Evaporation Pan
District Capital
PALK STRAIT
LAGOON
BAY OF BENGAL
GULF OF MANNAR
INDIAN OCEAN
Jaffna
Kilinochchi
Mullaitivu
Mannar
Vavuniya
Trincomalee
Anuradhapura
Puttalam
Polonnaruwa
Batticaloa
Kurunegala
Matale
Kandy
Kegalle
Ampara
Gampaha
Nuwara Eliya
Badulla
Colombo
Monaragala
Ratnapura
Kalutara
Hambantota
Galle
Matara
MALWATU OYA
KALA OYA
DEDURU OYA
MAHA OYA
KELANI GANGA
KALU GANGA
GIN GANGA
MAHAWELI GANGA
GAL OYA
WALAWE GANGA
PRECIPITATION IN BASIN IN MILLION CUBIC METRES
PERCENTAGE DISCHARGE TO SEA
28,000
24,000
20,000
16,000
10,000
8,000
4,000
MEAN ANNUAL RAINFALL IN MILLIMETRES
> 5000
4000 – 5000
3000 – 4000
2000 – 3000
1500 – 2000
1000 – 1500
500 – 1000
SCALE 1 : 1,650,000
0 10 20 30 40 50 60 km

Introduction

- Definition

- Rainwater harvesting (RWH) is the capture and storage of rainwater for purposes such as potable and non potable uses, storm water abatement and landscape irrigation. It is a strategic tool and proactive approach for drought mitigation and alleviate water scarcity.

- Roof rainwater collection means getting clean water just from out side the door step.
- It’s method is simpler, reduces fetching time, economical, no toxic, no fluoride, minimize health risk.
- Harvested rainwater can be particularly useful when no other sources of water supply is available ,or if the available water supply is inadequate or poor quality.

Historical perspective

- Traditionally and Historically evolved methods of RWH
- The Great king Parakramabahu – Parakramabahu (1153 - 1186 A.D.) during Polonnaruwa kingdom. **"Not a single drop of water received from rain should be allowed to escape in to the sea without being utilized for the benefit of human kind."**

  Sigiriya Rock fortress. In the 5th century, the construction of Sigiriya rock fortress by the king Kasyapa was the unique and magnificent showpiece with storage tanks and swimming pools etc.to present as rain water collection model.

Water scarcity and or stress

inadequacy of water supply to match the demand

-There are four main underlying causes

1. Population increase and demand for Public amenities
   - Land clearing and reclamation
   - destruction to water bodies:
   - siltation affect to water sources,
   - high demand for potable water and sanitation.

Water scarcity and or stress
inadequacy of water supply to match the demand

2. Urbanization and new townships

- Construction of new infrastructure, new condominiums
- demand for pipe borne water and sanitation.

Water scarcity/stress

inadequacy of water supply to match the demand

3. Stress on pipe borne water supply (infrastructure and financial limitations).

new water supply schemes,

water supply infrastructure

costly maintenance

Water scarcity and or stress inadequacy of water supply to match the demand

4. Pipe borne water wastage
   - Flushing,
   - Washing and gardening.
   - public water wastage
   - water theft

Water scarcity/stress

inadequacy of water supply to match the demand

Direct causes

- Surface water contamination
  - Natural reasons such as pollution, chemical and negligence
  - Agriculture waste Agro chemicals, nutrient
  - Discharging effluent by industries
  - Dumping of Solid waste by local authorities and individuals

- Natural phenomena
  - -Geography, Geology naturally sloppy areas non availability of water
  - -Seasonal cycles such as Drought
  - -Disasters like earth slips .

Water scarcity/stress

inadequacy of water supply to match the demand

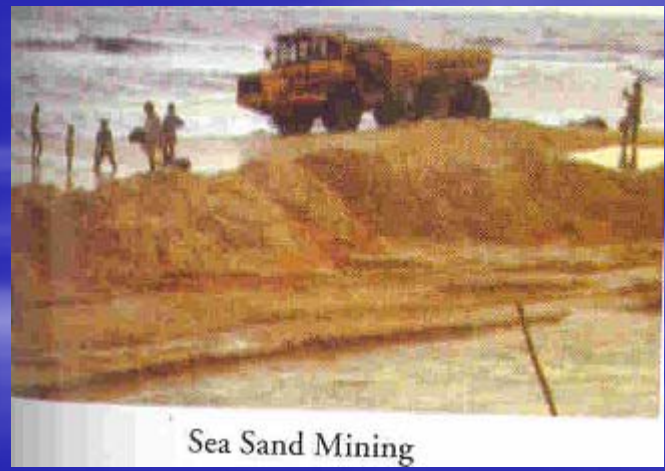
- Ground water resources depletion.

  - Water extraction for agriculture, Shrimp farms, domestic uses

  - Contamination due to salination, Chemical and toxic substances

  - Less seepage /ground absorption due to concrete canals and drainage

  - Mining for sand, quarry, gem or other minerals

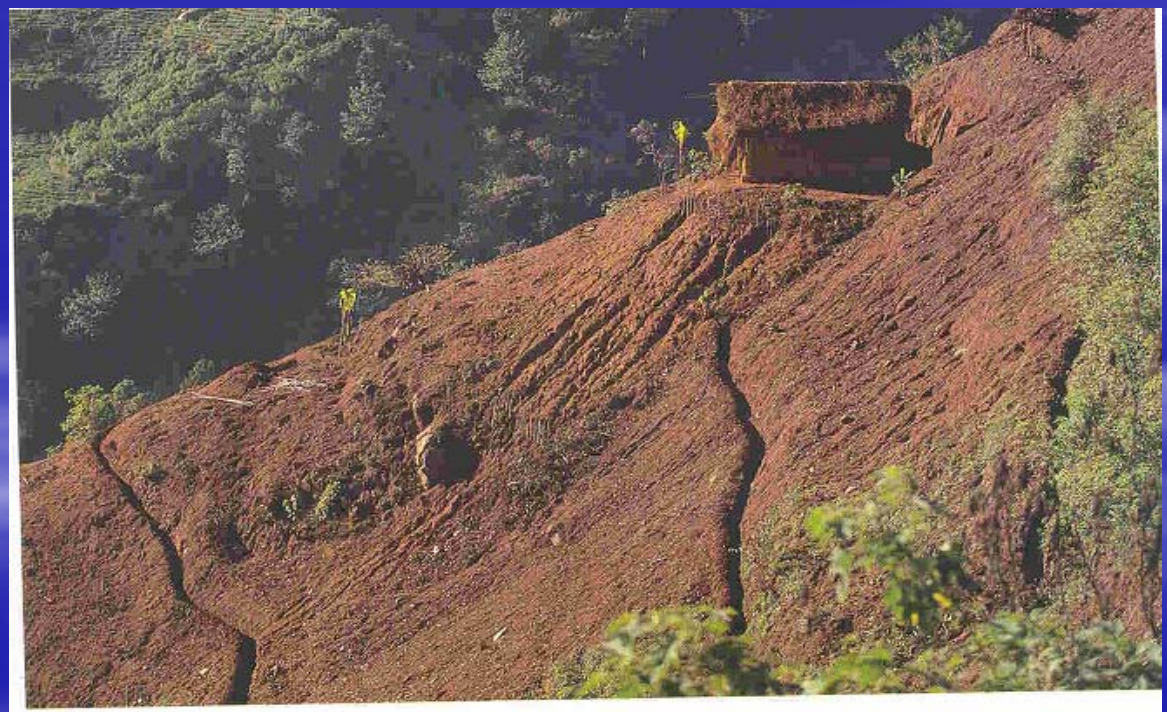


Sea Sand Mining

Traditional Open Gem Pit

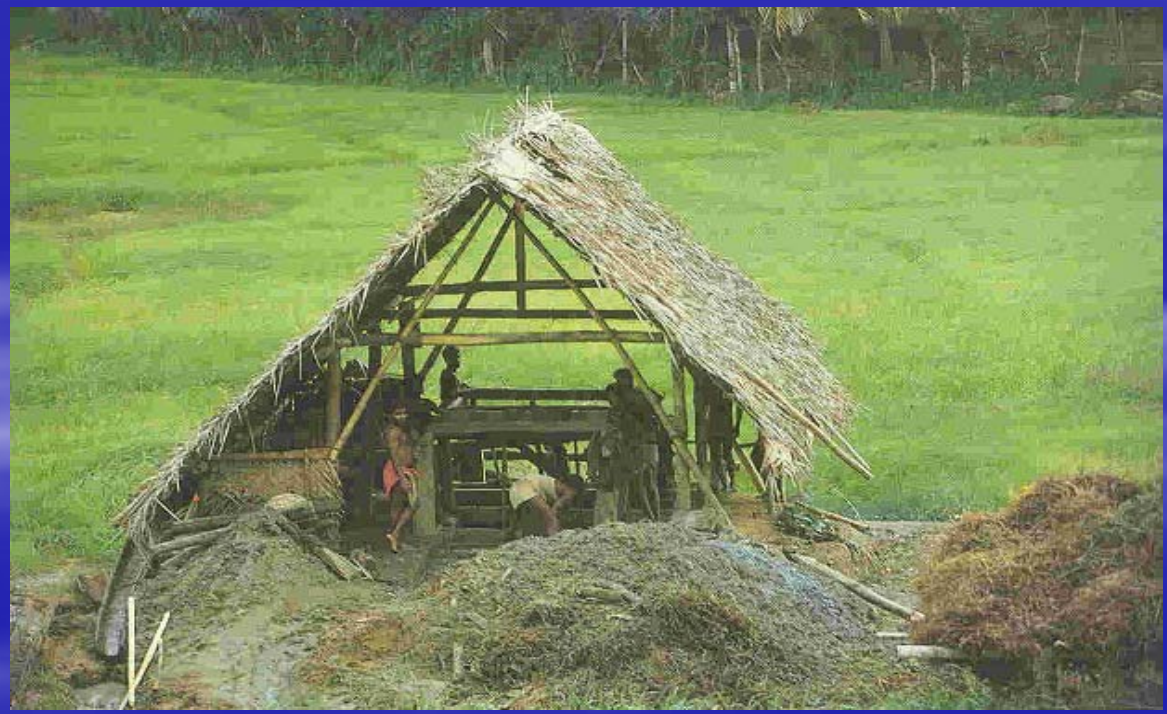
A Deep Gem Pit

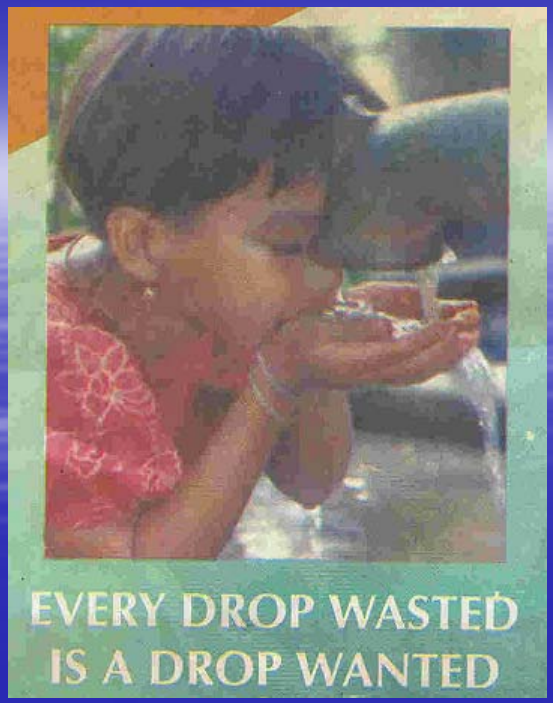
Dragging a Stream for Gems

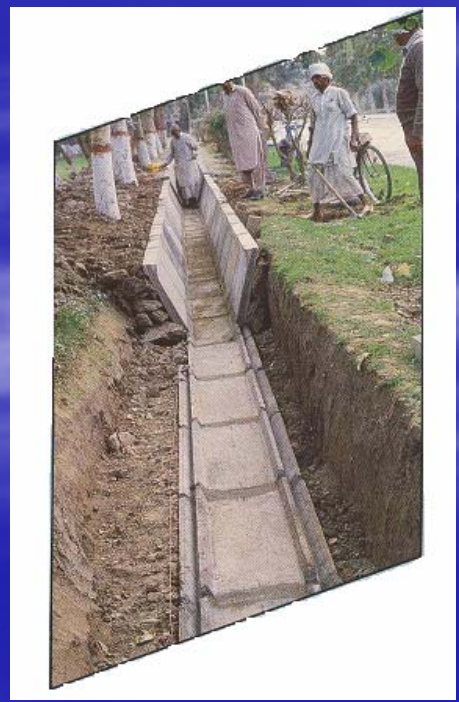


Land degradation on steep slopes contributes significantly to costly earth slides.


රථ ශාලා
கார் தரிப்பிடம்
CAR PARK




EVERY DROP WASTED
IS A DROP WANTED



Rainwater Potential

RAINWATER AVAILABILITY

Annual rain fall and rainy days

Met. stations	1961-90 Annual Average		2001		2002		2003		2004		2005		2006	
	Rainfall mm	No of Rainy days	Rainfall mm	No of Rainy days	Rainfall mm	No of Rainy days	Rainfall mm	No of Rainy days	Rainfall mm	No of Rainy days	Rainfall mm	No of Rainy days	Rainfall mm	No of Rainy days
Anuradhapura	1285	89	1262	104	1260	99	1192	97	1444	114	799	87	1324	93
Bandarawela	1572	129	1539	146	1602	147	1498	136	1591	154	1516	155	2081	177
Colombo	2424	146	1933	132	2100	174	2030	158	1958	162	2814	163	2723	173
Hambantota	1050	87	730	75	982	95	1273	97	1165	104	978	82	1334	133
Kandy	1840	148	1922	164	1927	171	1502	158	1565	168	1784	179	2121	188
NuwaraEliya	1905	163	1681	189	1517	186	1374	170	1741	206	1347	188	2555	219
Ratnapura	3749	205	3264	205	3202	215	4021	209	3742	229	3405	211	3736	243
Trincomalee	1580	86	1431	103	1725	83	1425	97	1926	118	1792	87	78	15

Source: Central Bank reports

Rainwater harvesting potential
Data on roof and rainfall
(TWD web site)

Roof top area (Sq.m)	Rain fall (mm) and flow efficiency between 85-90%												
	100	200	300	400	500	600	800	1000	1200	1400	1600	1800	2000
HARVESTED WATER FROM ROOF TOP (Cum)													
20	1.6	3.2	4.8	6.4	8	9.6	12.8	16	19.2	22.4	25.6	28.8	32
30	2.4	4.8	7.2	9.6	12	14.4	19.2	24	28.8	33.6	38.4	43.2	48
40	3.2	6.4	9.6	12.8	16	19.2	25.6	32	38.4	44.8	51.2	57.6	64
50	4	8	12	16	20	24	32	40	48	56	64	72	80
60	4.8	9.6	14.4	19.2	24	28.8	38.4	48	57.6	67.2	76.8	86.4	96
70	5.6	11.2	16.8	22.4	28	33.6	44.8	56	67.2	78.4	89.6	100.8	112
80	6.4	12.8	19.2	25.6	32	38.4	51.2	64	76.8	89.6	102.4	115.2	128
90	7.2	14.4	21.6	28.8	36	43.2	57.6	72	86.4	100.8	115.2	129.6	144
100	8	16	24	32	40	48	64	80	96	112	128	144	160
150	12	24	36	48	60	72	96	120	144	168	192	216	240
200	16	32	48	64	80	96	128	160	192	224	256	288	320
250	20	40	60	80	100	120	160	200	240	280	320	360	400
300	24	48	72	96	120	144	192	240	288	336	384	432	480
400	32	64	96	128	160	192	256	320	384	448	512	576	640
500	40	80	120	160	200	240	320	400	480	560	640	720	800
1000	80	160	240	320	400	480	640	800	960	1120	1280	1440	1600
2000	160	320	480	640	800	960	1280	1600	1920	2240	2560	2880	3200
3000	240	480	720	960	1200	1440	1920	2400	2880	3360	3840	4320	4800

Benefits from rainwater

- **Reduce water stress** to the people who practice RWH
- **Time** saving from fetching of water
- **Health-** reduce water contamination
- **Cost of water-** No or less: water bills, water bowser cost, transport expenses**.**
- **Living condition** improvement by labour time saving and water for better sanitation
- **Support to environment** water replenishment
- **Reduce stress** to govt. by reducing heavy investment on infrastructure and it's maintenances.

Rainwater tanks

RWH systems have solved the problem

Avoiding water tanker during seasonal water shortages

People carrying water from distances

Measures to be considered for future

- -Integrated approach –Public, NGOO, CBOO, Govt, institutions, local authorities and village level other organizations.
- -Government patronage.- Concessions, subsidies, Tax rebates, govt sponsored funding arrangements such as matching grants.
- -Develop mechanism based on policy-. individual Activity based work programme
- -New schemes for implementation - Public private partnership programmes
- -Reduce misconceptions among people-Measure to improve rainwater quality for people to believe value of rainwater
- -Show benefits- improvement to livelihood, economic benefits, improve sanitation.
- -Creation of Awareness –Different types of awareness programmes
- -Make Legal /mandatory requirement –Such as Chennai/ bangalore India, selected cities in Japan ,Texas USA,

Future interventions

Issues	Programme	Activities	Benefits
No policy interventions	Policy based development approach	Introduce legislative support: flood mitigation, Building and apartment construction approval with (COC) Road development; NWSDB by laws development	Stormwater control, Reduction in Cost to govt for water infrastructure Water security and confidence in water availability
Non availability of integrated approach	Integrated approach for development	Public participation, Govt patronage and support; NGOO involvement; village level community group involvement; identify role of the individual group	Collective effort; cost reduction; establish equity; fulfilling actual requirements; reduce misconceptions.
Lack of arrangement for water quality checking	Scientific approach	Water quality checking at intervals; Involve relevant agencies for advises and field work coordination.	Get confidence on water quality; development of proper mechanism for field programmes; Better coordination with relevant groups
Lack of awareness and education programme	Awareness and education programmes	Schools, temples and larger institutions based programmes for implementation.	Creation of awareweness among relevant groups and reduce misconceptions and popularize RWH

Future interventions

Need for demonstration tank construction programmes	Demonstration effect	Sponsored activities; demonstration tanks construction	Encourage people ;create tendency to have and own tank and popularize tank construction.
Assessment for incentives	Concessions and incentives	Tax rebates ,tax incentives; grants or matching grants; material supply.	Cost reduction in tank construction, more demand for water harvesting.
No institution interested in RWH	Institutional arrangements for RWH. Higher level commitment.	Study. infrastructure requirements	Benefit to the water authorities; reduction of monthly water expenses to the institution

Thank you