

DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

NATIONAL REPORT

AND

NATIONAL SUMMARY REPORT

PREPARED

FOR

IDNDR MID-TERM REVIEW

AND

THE 1994 WORLD CONFERENCE

ON

NATURAL DISASTER REDUCTION

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NATIONAL REPORT (SRI LANKA)

Prepared for the IDNDR Mid-Term Review and the 1994 World Conference on Natural Disaster Reduction.

(A) Geographical Setting

Sri Lanka is located between northern latitudes of 5° 51' and 9° 51' and eastern longitudes of 79° 40' and 81° 55', approximately 24 km to the south-east of India. Its land mass covers an area of nearly 65,000 sq. Km stretching 435 km from North to South and 224 km miles from West to East. The topography of the island consists of a central mountainous region rising to an altitude of over 2,750 m. The coastal plain which rises to a height of 300 m is narrow on the south-west and broad in the North and East.

The mean temperature remains around 80 fahrenheit with very little seasonal variations. The annual rainfall varies from 2,500 mm to over 5,000 mm in the south-west of the island, while in the north-west and south-east the averages are less than 2,500 mm. Climatically Sri Lanka lies within the tropical monsoon belt receiving most of the rainfall from two monsoons, which are north-east monsoon (December to February), and south-west monsoon (May to September). It would be interesting to note that some of the central hill-country districts are affected by both north-east and south west monsoon depending on the geographical locations while Kalutara district in the south-western region with hills of low altitude has been affected only once in the recent past by south-west monsoon.

Highlights of Sri Lanka's Economic Performance in 1992 were, economic growth rate of 4.3 per cent, remarkable expansion in industrial exports, a favourable balance of payments and a significant progress towards fiscal consolidation. The Gross Domestic Product (GDP) in real terms is estimated to have increased by 4.3 per cent in 1992. The Gross National Product (GNP) showed a growth of 4.4 per cent. Sri Lanka's mid-year population in 1992 has been estimated at 17.41 million. The per capita GNP at current prices had been estimated at Rs 21,641 (U.S. \$494) in 1992. This was an increase of 13.8 per cent over the previous year. The increase in per capita GNP in real terms was 3.5 per cent in 1992. In 1993, the total population of Sri Lanka was estimated at 17.5 million indicating an average increase of 1.3% during the period 1981 to 1991.

(B) Hazard Types

Sri Lanka is a disaster prone island. The major types of disasters that occur in Sri Lanka are cyclones, floods, droughts, landslides and coastal erosion. (see annex. 1) Coastal erosion is a creeping hazard, which is a continuous process and floods and droughts are

experienced almost every year. Although Sri Lanka is not on the so called orogenic belt, in December 1993 an earthquake tremor shook some parts of the Island. The Island is also susceptible to epidemics, fire and industrial hazards. The major hazards by types are as follows:

B.(1) Landslides

Sri Lanka has been experiencing a spate of landslides over extensive areas of its central and Southwest region since the early 80s. A sharp increase in landslide occurrences was witnessed in the recent years particularly in June 1981, then in May 1984, June 1985, January 1986, May-June 1989, June 1992 and October 1993 which hit the headlines in the Press, inflicted death and destruction and captured public imagination in a big way.

The first attempt to record systematically the damages caused by landslides in the hill country was made as part of a UNDP/UNCHS Technical assistance project which commenced in 1986 at the National Building Research Organization (NBRO). Extensive reconnaissance survey of the affected areas in the hill country districts carried out under this project revealed that parts of seven districts namely Badulla, Kandy, Kegalle, Matale, Nuwara Eliya, Kalutara and Ratnapura covering nearly 12% of the hilly and mountainous region are over these 7 districts is highly prone to landslides. Approximately a total extent of 10,000 sq. Km in the above seven districts may be considered as vulnerable to landslides.

B.(2) Floods

There are 103 rivers originating from the central part of the country. Most of these rivers originate at an approximate elevation of 2,000 m. Of these, 20 are major rivers of which Kelani Ganga, Kalu Ganga, Gin Ganga, Nilwala Ganga, Walawe Ganga, and Mahaweli Ganga, experience floods annually. Among the 1 million people living in these river basins, an average of 200,000 people are affected by floods annually.

B.(3) Coastal Erosion

Sri Lanka is an island with a coastline of 1,585 Km. The coastal areas are generally low lying and morphology exhibits considerable variety, such as bays, headlands, lagoons, coastal masses and dunes. Marine habitats of coral reefs and sea grass beds are also common. Many activities in the near shore area or in the intermediate near shore result in erosion or accretion. The concept of coastal resource management has arisen with the view to regulate the activities of coastal zone and to maintain the long term sustainable use of coastal resources. The Coast Conservation Act No. 57 of 1981 came into operation on October 01st 1983. The Act aims to control activities which create coastal instability and erosion. Coastal erosion is a severe problem in Sri Lanka due to the damages it causes to the public and private properties and infrastructure. The impact of coastal erosion is more severe along the Western and South-western Coasts.

B.(4) Cyclones

Although cyclones do not occur frequently in Sri Lanka, the Island is not totally outside the range of cyclones. During the period 1881 - 1993, twenty cyclones and cyclonic depressions have either formed in the vicinity of the Island or have crossed over causing damage to life and property. In the past 72 years cyclones that occurred in 1931, 1952, 1964, and 1978 caused severe damages.

C. Risk Assessment

Sri Lanka is exposed to four major kinds of natural disasters. Some areas are exposed to more than one kind of hazard. Information on occurrences of such hazards, their causative factors, the areas affected or exposed to risk, losses sustained, relief and recovery activities undertaken, and the costs incurred is available to some extent. Due to the high literacy rate and awareness and education programmes conducted, there is a satisfactory level of general risk awareness among the general public. The frequency of disasters and their intensity resulting in heavy loss of lives and property have also created consciousness and awareness in the minds of development planners.

The identification of vulnerable groups and livelihood at risk has not been carried out on a systematic basis. About 40 per cent of the population of Sri Lanka are below the poverty line. The poor are more vulnerable even to minor hazards. A large number of landless people have settled as squatters on landslide prone areas and along the banks of rivers. The habitats along the sea coast are vulnerable for cyclones and liable to damages due to coastal erosion.

Systematic collection of data on direct and indirect effects of natural disasters is yet to be undertaken. The paucity of such data is a grave constraint on the assessment of economic vulnerability. Except for information on relief and rehabilitation expenditures, number of affected people and houses; the information on direct and indirect losses to buildings, infrastructure, Industry and Agriculture caused by natural disasters is hardly available. However, systematic efforts are being made now to assess the direct losses in the event of natural disasters. Funds available for investment in development projects are sometime diverted to relief, rehabilitation and reconstruction of damaged/destroyed infrastructure. This retards development. The effects of natural disasters are compounded by poverty and rapid population growth and landlessness. Poverty alleviation programmes are presently implemented to reduce the vulnerability of the poor and "Janasaviya" could be highlighted as one of the effective programmes.

C.(1) Floods

Floods are caused by the excess of run-off causing overflow. Though not of great immensity, floods serious enough are annual features in Sri Lanka and are mainly influenced by continuous and excessive rainfall during monsoonal and depressional periods affecting parts of the island. Rivers in the south-west quadrant which are in the wet-zone are more vulnerable to

floods due to heavy and prolonged precipitation, whilst those in the dry-zone are similarly affected during depression of the north-east monsoon period. Floods also occur during inter monsoonal periods.

In the wet-zone, it most frequently occurs when the south-west monsoon coincides with localized depression. In the dry-zone, floods are caused by similar conditions during the north-east monsoon. In the Western part of the country the Kelani, Kalu, Gin and Nilwala rivers are those subject to serious floods. These river systems show steep gradients in their upper courses and extensive and densely populated flood plains in their lower courses. Most rivers are either obstructed or close at their mouths and consequently exits are diverted. This hindrance to direct drainage and flow creates upstream collection and submergence of lowlands.

About 64% of the total annual precipitation is discharged through Kelani and Kalu Ganga. Dangerous floods have been recorded of the Kelani river in Colombo in October 1913, May 1930, May 1940, August 1947, 1957, 1967, 1978 and 1989.

Lower reaches of these two major rivers in the wet-zone are subject to frequent and often serious floods. The phenomenon of inundation of the Ratnapura city, in the upper reaches of Kalu Ganga is caused due to insufficient discharge capacity of the sector of the river a few kilometers downstream. Minor floods are caused every other year and major floods occur with a return period of 10 years in Kelani Ganga, and every 5 years in the Kalu Ganga generally.

Flooding has been no less severe in the case of several dry-zone rivers. Flash floods result from rainfall of high intensity and short duration. 125 mm/day of rain have been recorded at several stations in the dry-zone. The highest amount so far recorded for a 24 hour period was 805 mm on 15th December, 1887 at Nedunkerni, 40 Km south-west of Mullaitivu. On three days of the dark Christmas of 1957 - 24th, 25th and 26th December - a total of 1,240 mm of rainfall was recorded at Habarana, 80 Km south-west of Trincomalee. The floods that followed the cyclone of 1978, caused serious damage to 28% of the island affecting nearly a million people inhabiting the Batticaloa, Polonnaruwa, Ampara, Anuradhapura and Mannar districts.

The cost of rehabilitation due to the 1989 floods that affected Kegalle, Ratnapura, Kalutara, Colombo, Gampaha, Galle, Nuwara Eliya, Matara, Kurunegala and Kandy districts and the cost of damage due to the unprecedented number of landslides that occurred (mainly in the Kegalle district which was 76, Ratnapura 18, and Nuwara Eliya 10) and the devastating major floods of June 1989 alone was estimated to be Rs 1.4 billion equivalent to US \$ 35.5 million (UNDP/SRL/89/016).

This single disaster period tolled 300 deaths, left 85,000 families homeless, with another 15,000 homes partially destroyed, requiring relocation of families from dangerous sites to safer sites.

Encroachments and unauthorized settlers in flood prone areas specially near the big coastal towns - Colombo - Kalutara - Galle - Matara are a continuing social problem and connected with flood problems as victims. These people tend to return to their squatting sites as soon as the floods abate and continue to degrade the environment seriously jeopardizing their lives and the safety of others in the flood affected area.

C.(2) Drought

The dry-zone is generally considered as the drought prone area in Sri Lanka. In the extreme north-west in the Mannar Kalpitiya areas and in the extreme south-east - Yala area the mean/annual rainfall is below 1000 mm. The frequency and intensity of drought is favoured by the inequal distribution and insufficiency of rainfall both in time and space in the dry zone when the rain fall characteristics differ from its identified high seasonality with its bi-modal distribution, concentrated in October-January (the main or 'Maha' season) and in March-April (the minor or 'Yala' season) as generally accepted and their inter and intra seasonal variations, intensity, periodicity and reliability.

Advent and cessation of major droughts cannot be clearly identified. Nevertheless, their long durations of existence are clearly felt and the losses which are experienced by their victims can be determined with least efforts.

Unlike long droughts, short drought spells are less easily identifiable. Some short drought spells may even pass over without immediate notice. These unobserved drought spells, if they occur at certain critical stages of agriculture, can have lasting effects of production and consequently on the community. These dry spells are also sometimes identified using the state of rainlessness over short durations.

Every year somewhere in the country some people are faced with droughts of short-duration which are only of local significance. Droughts of regional if not of national significance, do occur once in every 3 - 4 years and severe droughts of national significance in irregularly spaced periods of time. After the severe drought of 1935 - 1937, the other severe droughts occurred during the periods 1947 - 1949, 1953 - 1956, 1965, 1974 - 1977 and 1981 - 1983. Of all these major droughts those which occurred during these periods 1953 - 1956, 1974 - 1977 and 1981 - 1983 caused major set backs to the agricultural community in Sri Lanka.

From 1947 to 1992, there were 29 droughts 'reported' to the Department of Social Services, seeking relief for the drought victims.

C.(3) Cyclones

The past experience shows that the eastern coast of Sri Lanka and western coast, north of Puttalam could be affected by cyclone. It is also possible that under some unusual combination of meteorological phenomena in the Indian Ocean and in the Arabian Sea, cyclonic winds could affect the western coast of Sri Lanka. Recording of cyclonic storms in Sri Lanka

reveal that the cyclonic season for Sri Lanka is November to December as 83% of the occurrences were during that period.

Out of the 12 cyclone storms that occurred between 1922 and 1978 four were severe. These occurred on 9th March 1907, 22nd November 1922, 22nd November 1964 and 23rd November 1978 respectively. The most devastating storm was the last one which cost 915 human lives.

C.(4) Coastal Erosion

Although the beaches are receding in most parts of the island, the impact of coast erosion is most severe along the western and south-western coasts and to a lesser extent in the Eastern coast. While there are isolated problems elsewhere, it is only on this segment that the problem is widespread. This is the most densely populated coastal region and where development is most intense.

Both the highway and railway are on or near the coast throughout most of these two coastal sectors. It has been estimated that along the coastal segment extending 685 Km from Kalpitiya to Yala National Park, about 175,000 - 285,000 square metres of coastal land are lost annually through erosion. Of this extent, about 145,000 square metres are lost annually from the 137 Km coastal segment that extend from the mouth of the Kelani river to Talawila (Kalpitiya Peninsula).

Erosion along Sri Lanka's beaches are a highly localized phenomenon, and within each sector, there is a wide variation in erosion and accretion rates. Whether erosion in a particular sector is viewed as a problem or not depends on the hinterland land uses.

Erosion regularly causes damage to and destruction of houses, and other coastal structures, undermines roads and railways and results in loss and degradation of coastal land. It also disrupts fishing, navigation, recreation and other activities.

About 75% of the graded hotels in Sri Lanka and 80% of the hotel rooms in Sri Lanka are located in coastal areas. Majority of these hotels have less than 50ft setback between buildings and the waterline. No major hotel buildings have been destroyed by erosion to date. This is because coast protection schemes have been implemented to protect the most vulnerable hotels. However, there are many instances where smaller structures have been damaged or destroyed. Several hotels have experienced decreased clientele attributed to the non-availability of beach in the hotel frontage.

The main railway link between Colombo and Matara runs near the coast along most of its length. In the area between Colombo and Panadura it runs in very close proximity to the beach, and most of it exists today only due to heavy coast protection works that have been carried out during the past several years to protect the railway line.

C.(5) Landslides

Sri Lankan landslides are known to threaten homesteads and human settlements, roads, railway lines, bridges and other infrastructure at dozens of locations particularly in the hill country. A systematic study carried out by the National Building Research Organisation (NBRO) has yielded a fairly clear picture of elements at risk. The database we improve when the graded landslide hazard maps of the landslide susceptible areas become available.

As for the losses, January 1986 landslides were by far the most wide spread till then affecting 51 lives and rendering in the process more than 100,000 families homeless. The damages to life and property caused by 1986 landslides were surpassed by landslides of May-June 1989 both in severity and extent of damages. More than 300 lives were lost.

Apart from causing wide spread destruction to life and personal property, landslides have wrecked havoc on the economic infrastructure in the affected districts. Disruptions have been caused to water supply, power generation and distribution, telecommunications, arterial roads linking the affected areas to several parts of the country, educational facilities etc. According to one estimate total damage to the economical infrastructure caused by 1989 landslides alone would, on a conservative basis, amount to Rs 2,800 million. What is more the recurring landslides are responsible for rapid destruction on the environment in the affected districts. The total extent of loss of forest cover, wild life, and damage to eco-systems cannot be easily estimated and will probably remain unknown forever.

The most recent landslide of October 8, 1993 in the Ratnapura District took a toll of 31 lives, rendering dozens of families homeless.

Sri Lanka had, as far back as 1990, launched a major programme of Landslides Hazards Zonation Mapping in its two districts considered most vulnerable to landslides. This pilot project being implemented by the Government of Sri Lanka, funded by the United Nations Development Programme, Colombo and executed by the United Nations Center for Human Settlements, Nairobi is well on its way to deliver the first set of land slide hazard maps at a scale of 1:10,000. Simultaneously with the mapping programme state of the nature maps of human settlements and infrastructure are being produced. The elements at risk stand well identified. Whereas lessons rooted in the earlier landslide catastrophies and disasters are still being learnt, a great deal more requires to be done not only to evolve and test the methodologies for risk assessment but also to set in motion a process by which all essential information and data could be reliably obtained, assembled and regularly updated.

D. Legal and Institutional Framework for Disaster Management

D.(1) Ministry of Reconstruction, Rehabilitation and Social Welfare

The realignment of the Ministries in April 1990 brought the office of the Ministry of Rehabilitation and Reconstruction which functioned under the Ministry of Finance and

the office of the Minister for Social Services into one Ministry namely Ministry of Reconstruction, Rehabilitation and Social Welfare to deal effectively with Disaster Management in Sri Lanka. The Ministry, inter alia is responsible for,

- (a) Formulation of programmes and projects based on national policy in respect of reconstruction, rehabilitation and social welfare and direction of the implementation of such programmes and projects.
- (b) Accelerated programme for natural disaster preparedness. Co-ordination and implementation of a series of preventive actions to abate and minimize loss of lives, property and trauma arising out of natural disasters.
- (c) Casual relief for loss of dwelling houses, implements of trade and fishing gear and crafts by fire, rain, storm or other exceptional causes.
- (d) Relief of distress due to landslides, floods, droughts, cyclones, epidemics and other such exceptional hazards and rehabilitation and resettlement of those affected.
- (e) Reactivating public institutions and utilities in areas affected by civil strife arising from ethnic violence and terrorist activities.
- (f) Providing immediate relief to displaced persons and returning refugees.
- (g) Resettlement and Rehabilitation of displaced persons and returning refugees by providing financial and other assistance.
- (h) Rehabilitation of affected properties, Industries/Businesses.
- (i) Safeguarding the ownership/tenancy of affected properties until reconstruction.

D.(2) Appointment of a Cabinet Sub-Committee on Natural Disasters

A cabinet sub-committee under the chairmanship of the Prime Minister was appointed consisting of the following ministers.

- (a). The Minister of Environment and Parliamentary Affairs.
- (b). The Minister of Public Administration Provincial Councils and Home Affairs.
- (c). The Minister of Reconstruction, Rehabilitation and Social Welfare
- (d). The Minister of Ports and Shipping

- (e). The Minister of Housing and Construction
- (f). The Minister of Agricultural Development and Research
- (g). The Minister of Lands, Irrigation and Mahaweli Development

The tasks assigned to this committee are :

- (a) to examine all matters relating to natural disasters such as floods, cyclones, earthslips and sea erosions.
- (b) to prepare and update where necessary disaster management plan to avoid or minimize loss of properties from such disasters. This Cabinet Sub-committee functions on a continuous basis and if necessary other Ministries will be coopted to the committee.

D.(3) Legislation

(a). Reconstruction and Rehabilitation Fund Act

An act to provide funds for rehabilitation and reconstruction was passed in Parliament in 1993.

(b). Draft Sri Lanka Disaster Counter Measures Bill

The draft legislation viz Sri Lanka Disaster Counter Measures Bill has been prepared and expected to be submitted to Parliament shortly.

The basic objectives of the draft bill are :

- (i) Prevention and Mitigation of Disaster.
- (ii) Protection of life and property from effects of disaster.
- (iii) Maintenance and restoration of order in areas affected by disaster.
- (iv) Provision of facilities for emergency response, relief, rehabilitation and reconstruction of infrastructure in the event of disaster.

It provides for inter alia :

- a. The establishment of a National Disaster Management Council under the Chairmanship of the Prime Minister. The council will consist of Ministers and Secretaries of Ministries who are involved in disaster management in Sri Lanka and of knowledgeable and experienced persons in disaster management nominated by His Excellency the President.
- b. The establishment of an advisory committee consisting of professionals and experts on disaster management to assist and advise the council on all matters concerning disaster management.
- c. Declaration of state of disaster in potential or affected areas by disaster.
- d. Preparation of disaster management plans at national, provincial, district, divisional and hamlet level and at institutional level under the direction of the council.
- e. Establishment of a National Disaster Management Centre to assist the council.

D.(4) National Disaster Management Plan

The Plan covers the following activities.

- a. Preparedness, mitigation and preventive action.
- b. Recovery, relief, rehabilitation and reconstruction.
- c. Enhancement of the awareness of disaster prevention and dissemination of knowledge on disaster management.
- d. Establishment of vigilance groups at hamlet level and hamlet, divisional, district and provincial disaster management committees.
- e. Development and improvement of Disaster Prevention facilities and equipment.
- f. Improvement of meteorological observation, forecast and warning systems.
- g. Control of floods, landslides, industrial hazards, epidemics and cyclones.

E. Mitigation Activities

E.(1) Landslides

During the International Decade for Natural Disaster Reduction focus was turned on streamlining mitigation activities with a view to reduce the probability and impact of potentially disastrous landslide events. Some of the major initiatives are outlined below.

National Building Research Organization in Colombo is currently being strengthened as an apex organization in the country to carry out landslide studies and services. The UN sponsored landslide Hazard Mapping Project inter alia, aims at:

- (1) Self reliance with adequate institutional capacity to study and service multi-disciplinary and diverse aspects of landslide hazards, and provide nation wide consultancy services.
- (2) A complement of state-of-nature maps and integrated landslides hazard maps at a large enough scale of 1:10,000 to facilitate planning for sustainable development of housing, land alienation and infrastructure in the hill country.
- (3) A full fledged landslide investigation, instrumentation and monitoring laboratory at NBRO.
- (4) Socio-economic profiles of the communities affected by landslide or those living constantly under the threat of landslide.
- (5) Guidelines and Manuals on multi-faceted aspects of landslide studies for training, retraining and sustainability.
- (6) A Database on landslides for NBRO to serve as a clearing house of information on landslides.
- (7) A running record of in-depth studies on major landslides faced from time to time.
- (8) A national and international net-work.
- (9) R&D Publications in national and international journals and conference proceedings.
- (10) First National Symposium on Landslides.

E.(2) Floods

The Colombo flood organization was originally prepared in 1922 and the existing dikes are the result of flood protection work carried out by the Irrigation Department in 1922 - 1924. Due to rapid development in the river basin and high land values in the low lying areas, there

is no room for any structural solutions. Therefore, one of the effective alternatives is to provide an alert system, whereby the public can be warned in advance. In 1947 Colombo experienced one of the highest floods, breaching the flood protection works. Similarly, major floods occurred in 1967 and 1968. Floods in Kelani Ganga are of great importance, because of its geographic location of the sea outlet near the capital city of Colombo. In 1989 the major flood displaced about 225,000 residents and damages were estimated at Rs 120 million.

The Kalu Ganga basin is located entirely in the wet-zone and floods in Ratnapura are more frequent. But due to the very short lead time available due to steepness of the upper reaches, a flood forecasting system based on the observed rainfall cannot be implemented.

A scheme of organization for the mitigation of floods in Colombo and suburbs due to Kelani Ganga has been prepared in 1993 as a pilot project. The preparation of this document is the work of a representative committee under the Technical Advisory Group convened by the Director of Irrigation during the latter part of 1993. This document is a comprehensive one and it provides detailed standing orders for individual institutions involved in the implementation and the co-ordinating mechanism to mitigate floods in Kelani Ganga. It is proposed to prepare similar work plans for other river basins after studying the feasibility of implementation of this scheme. For houses affected by the floods assistance is granted on conditions that the houses are constructed according to norms laid down by the Department of Social Services, This is to ensure that the reconstructed houses are flood resistant.

E.(3) The Coastal Erosion

In 1986 Coast Conservation Department prepared a Coast Erosion Management Plan. Implementation of the schemes recommended in the plan commenced in 1988. To date 3 major projects funded by DANIDA have been undertaken. These are ;

1. Negombo coast protection schemes (completed). Total cost - Rs 175 million.
2. Moratuwa coast protection scheme (completed). Total cost - Rs 135 million.
3. Coast protective scheme between Beruwela and Weligama mainly in areas where the highway is threatened by erosion (completed). Total cost - Rs 380 million.

Technical assistance has also been provided by the German Technical Assistance Agency (GTZ) of the German Government for strengthening the Coast Conservation Department. The broad areas of intervention are ;

- Data base on coastal situation and ware measurements.
- Pilot projects for coast protection.
- Equipment and maintenance.
- Structures, training programmes and environment education.

Under USAID programme the Coastal Zone Management Plan recommends set-back standards for various development activities such as commercial, industrial and human settlements.

Two projects at a cost of Rs 24 million is being implemented presently to counter coast erosion.

E.(4) Drought

Droughts mainly affect the dry-zone area. The districts of Polonnaruwa, Anuradhapura, Trincomalee, Batticaloa and Ampara are the districts that suffer most due to drought annually. The Mahaweli Ganga diversion scheme has contributed to mitigate the impact of drought in major parts of these districts due to continued supply of irrigable water for cultivation. It has become possible to do Maha and Yala cultivation under the major and minor tanks in most parts of these districts. The implementation of water management for agriculture mainly for paddy cultivation in the dry-zone areas has also reduced the impacts of droughts.

F. Warning

F.(1) Landslides

The three essential elements attracting attention are:

- (a) Development of appropriate criteria for early warning;
- (b) introduction of appropriate technologies for early warning and;
- (c) public awareness education and training to be able to make a timely meaning out of the signals relayed.

Some studies have been done towards evolving indicators for early warning based on rainfall data. Considerable additional inputs are necessary to facilitate reliable continuous rainfall recordings particularly of high intensity short duration rainfall events, known to trigger catastrophies due to earth/debris flow.

Modest efforts have also been made to experiment with electrical detection wire fences for early warning against one of the rockfall cum debris flow sites in the hill country of Sri Lanka.

There is an urgent need however, to create a network of slope instrumentation at all the known hazardous locations and launch multi-disciplinary studies so as to obtain reliable data for early warning and preventive action.

Whereas skills of planning and implementation of instrumentation programmes are fairly well developed in the country, need for additional lateral inputs in improving channels of communication, speedy interpretation of data, prompt relay of early warning signals and public education to make meaning out of the signals relayed.

F.(2). Cyclones

The responsibility of the cyclone warning in Sri Lanka rests with the Department of Meteorology. Tropical cyclone warnings are provided from the National Meteorological Centre (NMC) in Colombo. The NMC is responsible for issuing warnings for the areas in the Indian Ocean, Arabian sea and Bay of Bengal from equator to 10° North and between 60° East to 95° East.

The cyclones are tracked with the help of conventional observations, radar, satellite observations and aircraft reports. There are 22 Meteorological offices in the country taking round the clock three hourly observations on routine basis. Whenever there is any threat of a cyclone the observers are instructed to conduct hourly observations.

National Meteorological Centre issues a cyclone alert/warning when a depression or a storm is about 550 Km off the coast. This bulletin indicates (a) distance of storm centre from coast, (b) speed and direction of movement and (c) maximum surface wind speed etc. This bulletin is issued once in every six hours.

When the tropical storm is 300 Km off coast warnings are issued every three hours. Points of land fall and the areas likely to get affected are also indicated in this bulletin. These bulletins are intended for coastal shipping and fishing, for the public services, local administration of relevant districts, irrigation, highways etc. and includes the Secretary to the Prime Minister (for Disaster Preparedness). The warnings/bulletins are disseminated through Colombo radio, Sri Lanka Broadcasting Corporation, Sri Lanka Rupavahini Corporation, and press. Individual bulletins are despatched to relevant administrators and others concerned.

In case heavy precipitations are likely during a cyclone or any other disturbed condition, special forecast is issued to the Director of Irrigation for flood forecasting purposes.

F.(3). Floods

There is no flood warning system for a single river in Sri Lanka. A system was installed for the first time in Nilwala Ganga by the French as part of the Nilwala Ganga flood protection scheme financed by the French Government. It was however, disturbed during the youth unrest in that part of the country in 1988.

G. International Assistance.

All international assistance for disaster management is channelled through the Department of External Resources of the Ministry of Finance. The Ministry of Finance in consultation with Ministries and Departments involved in disaster management brief and negotiate, with bi-lateral and multilateral donor agencies for assistance to implement disaster counter measures and also for donor assistance for relief, rehabilitation and reconstruction in the event of disaster.

International cooperation in terms of importation of expertise, funding and training are essential in the areas of landslides, floods and cyclones. The recent earthquake in Sri Lanka and several others in peninsular India seem to underline the need for initiation of micro seismic monitoring for possible early warning against earthquakes. Sri Lanka also should be linked with global positioning satellites and international database for quick retrieval of information and data to aid timely action.

G.(1) Landslides

The need for international cooperation is imperative particularly in the area of Institutional Capacity Building. When the UNDP funded Landslide Hazards Mapping Project comes to fruition in early 1995, Sri Lanka would have gained institutional capacity to study and service landslides. For their effective management however, unless there is a constant upgradation of institutional capacity and strengthening of infrastructure for implementation, end results may not be seen. One time large investments are necessary for making a good start for which need for further building up international cooperation can never be over emphasised.

G.(2) Floods

A flood mitigation project was prepared in 1988 for the World Meteorological Organization through the UNDP to obtain financial assistance. A mission also visited the country and the project documents were prepared. The total cost of the project was US \$ 747,000 with a nominal local component by the Sri Lankan government. This project was also approved by the Ministries concerned and the UNDP. However, due to low priority given at the time of finalizing the 5th Country Programme of the UNDP, funds were not made available during 1992 and 1993.

G.(3) Coastal Erosion

Coastal Zone Management Plan was prepared with technical assistance from the University of Rhode Islands (URI) under USAID programme. Under the CRM/URI project of NAREP a review of the setback as given in the Coastal Zone Management Plan is being carried out leading towards a revision of these said standards.

II. Awareness and Education Programmes

The need for counter disaster training and awareness programmes to promote an informed, alert and self-reliant community, capable of playing it's full part in support of and in co-operation with government in all relevant disaster management matters have been understood and accepted by the development planners and disaster managers in Sri Lanka. The policy of the government is to train government officials involved in counter disaster activities and to create awareness among the public.

Twenty five government officials have been trained in disaster management at the Asian Disaster Preparedness Centre, A.I.T. Bangkok since 1989.

Seven provincial workshops on disaster management have been planned by the Ministry of Reconstruction, Rehabilitation & Social Welfare in collaboration with SCF (UK) and five of them have been conducted. About 125 officials of the government and NGO sector participated in the workshops.

Sri Lanka Institute of Development Administration (SLIDA) has included disaster management in the training curriculum for Divisional Secretaries and more than 200 Divisional Secretaries have benefitted so far. Apart from this SLIDA also conducts disaster management courses for senior and middle level disaster managers.

The Institute of Fundamental Studies, Sri Lanka Red Cross Society, Institute of Engineers, Sri Lanka, and Ambulance Brigade have been organizing workshops and seminars on disaster management.

National Building Research Organization (NBRO) conducted thirteen awareness programmes between 1991 and 1993 in the Badulla and Nuwara Eliya districts. NBRO in collaboration with the other agencies concerned is organizing a National Symposium on Landslides to be held in March 1994.

I. Overall Evaluation and Future Programmes of International Decade for Natural Disaster Reduction (IDNDR) Activities

1.1 Achievements

The importance of natural disaster prevention and mitigation has gained acceptance and appreciation from the political leaders, planners and the community at large in the recent past. The bias towards relief and rehabilitation has now been corrected to give due attention to prevention and mitigation as well. The manifestation of disaster awareness has resulted in the appointment of a Cabinet Sub-committee under the chairmanship of the Prime Minister consisting of Cabinet Ministers involved in disaster management. The committee is entrusted with the tasks of examining all matters relating to natural disasters such as floods, cyclones, landslides, sea erosion etc., prepare and implement where necessary disaster management plans. This committee through an official sub-committee has prepared the draft Sri Lanka Disaster Counter Measures Bill and the National Disaster Management Plan. The bill meets the long felt need for Legal and Institutional framework for disaster management in Sri Lanka.

The draft Sri Lanka Disaster Counter Measures Bill provides for preparation and implementation of disaster counter measures and creation of appropriate institutions to deal with disaster. The National Disaster Management Centre and an Advisory Committee on disaster management will be established to facilitate the effective functioning of the council to achieve its objectives. An Act to establish a Fund for Rehabilitation and Reconstruction has been passed in Parliament.

The National Disaster Management Plan consists of projects to strengthen the capabilities of the institutions involved in disaster management and the short-term and long-term measures to prevent and mitigate the effects of disasters.

The establishment of a single Ministry viz. Reconstruction, Rehabilitation and Social Welfare has contributed to the effective coordination and implementation of Counter Disaster Measures. The government policy is to identify policies and measures which safeguard life and property from the impact of natural disasters.

Disaster prevention and mitigation will become an integral part of policy planning, implementation, training and resource allocation. As poverty is recognized as the root cause for the vulnerability of the population, poverty alleviation programmes are being expanded to enhance the capabilities of the people and reduce their vulnerability.

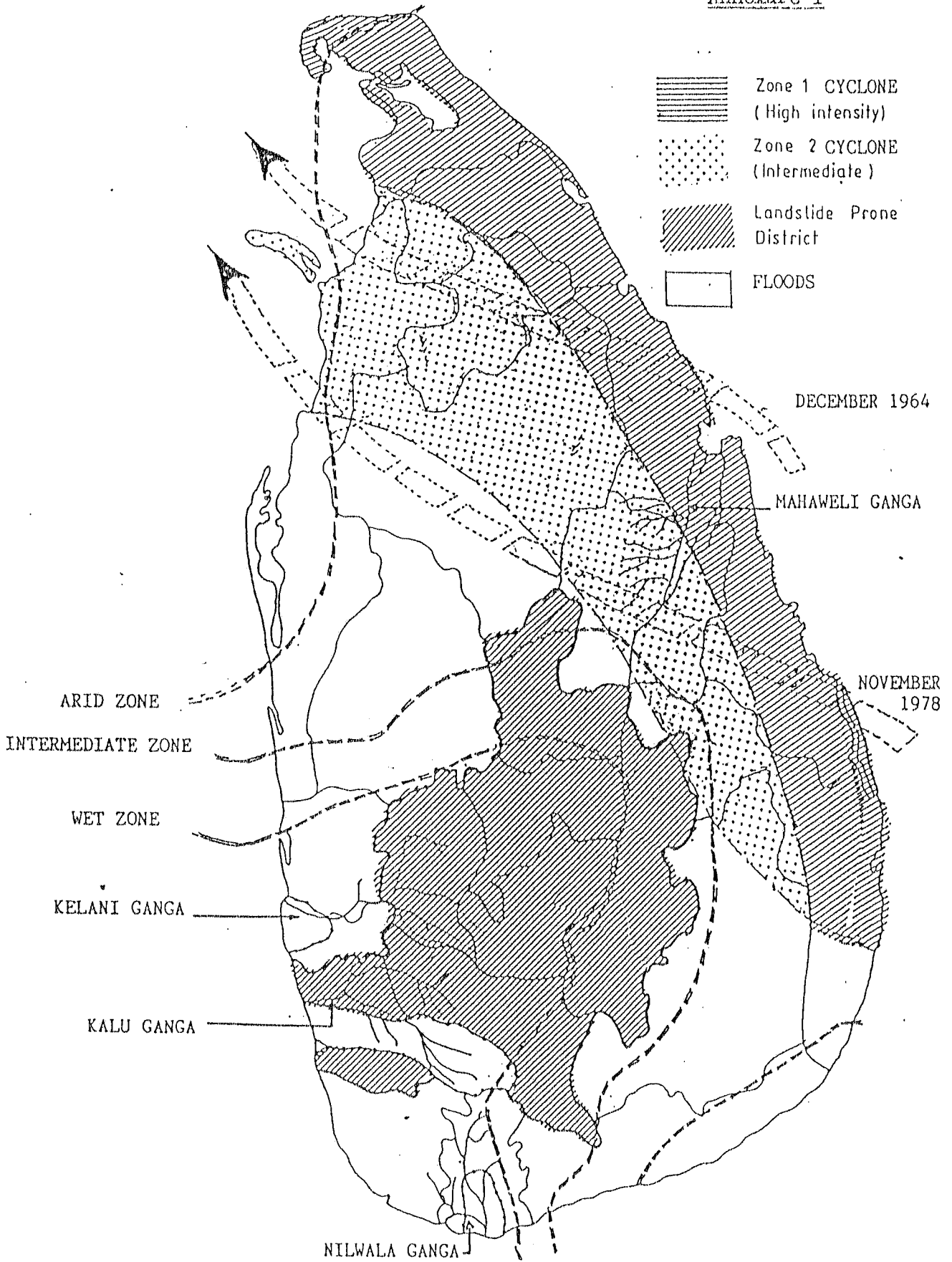
Considerable progress has been made on landslide prevention and mitigation activities. Landslide Hazard Mapping in two of the seven landslide prone districts is in progress. Methodology of landslide hazard mapping has been finalized. A complement of state-of-nature maps covering 1,100 sq. Km of area has already been prepared. Production of hazard maps are in progress. A full fledged laboratory for landslide investigation is being established at the NBRO. This task is targeted for completion by March 1995. The staff of NBRO is currently being trained on all aspects of mapping investigation, instrumentation, monitoring and remediation of landslide.

I.(2) Expectation and Plans for the Second half of the decade

- (a) Establishment of an institutional framework envisaged in the draft Sri Lanka Disaster Counter Measures Bill and National Disaster Management Plan.
- (b) Enhancing the capability of National Building Research Organisation to sustain the Landslide Hazard Mapping Work for effective coverage of the entire hill country so as to deliver graded landslide hazard maps to serve as effective tools for planning of housing and infrastructure in the hill country.
- (c) Launch a systematic programme of slope instrumentation and scientific monitoring of at least all known hazardous landslides locations to initiate the process of obtaining reliable observational data for early warning. Implicit in this activity is the development of criteria for early warning, procurement and planting of instruments and their systematic monitoring, data processing and creating systems for efficient relay of information and follow up of early warning signals.
- (d) Improving the facilities of the Department of Meteorology.
- (e) Strengthening the capabilities of institutions identified as being those more suitable to respond to large scale industrial accidents.

- (f) Provision of better communication and safety equipments to Civil Defence Institutions.
- (g) Installation of effective flood control measures and flood alert systems and improving the existing hydrological network.
- (h) Expanding counter measures to minimize coastal erosion.
- (i) Acceleration and expansion of awareness and education programmes.
- (j) Enhancing the capabilities of the Ministry of Health to prevent communicable diseases.
- (k) Formulation and implementation of poverty alleviation programmes to reduce the vulnerability and increase the capabilities of the vulnerable groups.
- (l) Seek International Assistance to enhance the Disaster Management capabilities of the country.
- (m) Enhancing the capabilities of the Department of Social Services to effectively get involved in disaster preparedness and mitigation and strengthen the relief and rehabilitation mechanism.

Annexure I



SPATIAL DISTRIBUTION OF NATURAL DISASTERS IN SRI LANKA

S R I L A N K A
N A T I O N A L S U M M A R Y R E P O R T
I D N D R

| | |
|---|--|
| Contact : Mr. Christie Silva Secretary Ministry of Reconstruction, Rehabilitation and Social Welfare | Phone 01/502968 Fax 01/502968 Telex 23072 NRSC |
|---|--|

S E C T I O N A : P R O F I L E

(This section contains relevant basic information about you
Please complete and check the information already included)

1. **Composition of National Committee (Focal point)** Ministry of Reconstruction,
Rehabilitation and Social Welfare
-

The Ministry of Reconstruction, Rehabilitation and Social Welfare is the focal point. The national committee will be established once the draft legislation namely Sri Lanka Disaster Counter Measures Bill is passed in the Parliament.

2. **International organisation of the National Committee**
-

(Please describe hierarchy, responsibilities, coordination and cooperation mechanisms in natural disaster reduction activities)

The Ministry of Reconstruction Rehabilitation and Social Welfare is assigned the tasks of Disaster Management in Sri Lanka. The Ministry is headed by a Cabinet Minister. The Ministry discharges it's functions utilising the normal administrative machinery. The natural disaster reduction activities are undertaken by various Ministries and institutions. Some of them are Department of Meteorology, Department of Coast Conservation, Ministry of Irrigation, National Building Research Organisation, Ministry of Agriculture and Ministry of Health and Womens Affairs.

3. Prevailing hazards

| Type | Location | Affected Population |
|-----------------|--|---------------------|
| Floods | Kelani Ganga, Kalu Ganga, Gin Ganga, Nilwala Ganga, Walawe Ganga and Mahaweli Ganga basins | about one million |
| Landslides | Districts of Badulla, Kandy, Kegalle, Matale, Nuwara Eliya, Kalutara and Ratnapura | |
| Cyclones | Eastern coast of Sri Lanka and Western coast north of Puttlam | |
| Droughts | Dry Zone of Sri Lanka | |
| Coastal Erosion | Western, South Western and Eastern coasts of Sri Lanka | |

4. Recent natural disasters

| Type | Location | Affected Population | Losses |
|---------------------|---|--|----------------|
| Floods June 1992 | Districts of Colombo, Gampaha, Galle, Kalutara and Ratnapura | 71,080 families | |
| May/June 1993 | Districts of Ratnapura, Kalutara, Colombo, Gampaha, Kilinochchi and Matara | 78,460 families | |
| December 1993 | Districts of Puttlam, Kurunegala, Anuradhapura, Polonnaruwa, Ampara, Batticaloa, Vavuniya, Trincomalee, Mannar, Kilinochchi, Mullaitivu, Jaffna | 154,291 families | Being assessed |
| Landslides 1992 | Watawala | affected the Railway line and disrupted the rail transport | |
| 1993 | District of Ratnapura | 27,000 families | 36 persons |

5. National socio-economic conditions

- * Population estimated 17.41 million - (mid-year 1992)
- * Gross National Product Rs 376,660 million (1992) - at current factor cost prices
- * Per-Capita Income US \$ 494

6. Availability of assistance to other countries in the field of natural disaster reduction

(Please list potential resources, scientific expertise, technology etc.)

1. Methodology of landslides hazard mapping
2. Joint scientific studies on Instrumentation, Monitoring, and Forecasting of landslides for early warning.

7. International assistance required for natural disaster reduction

(Please indicate requirements for scientific expertise, technology resources etc.)

1. Instrumentation for detection of symptoms for early warning against landslides, floods, cyclones, earthquakes, droughts, and forest fires.
2. Communication systems for speedy relay of warning signals.
3. Modern equipment and technology for prompt and efficient rescue operations, say for example, exhumation of people buried under a heap of landslides debris.
4. Equipment and machinery for institutional strengthening of problematic slopes, and for remediation of landslides. Equipments for rock-bolting, anchoring, deep drainage, horizontal drilling etc. are urgent need in Sri Lanka.
5. Access to international satellites and databases.
6. Establishing a seismograph network for seismic zonation.
7. Reproduction equipment including coloured zok machines, high resolution photographic equipment etc.

SECTION B
STRATEGIES AND ACTIVITIES

(This section deals with current or planned strategies
and activities)

1. Steps towards achieving the 3 main Decade targets

(a) Comprehensive national assessments of risk from natural hazards, with these assessments taken into account in development plans.

- 1 Initiation of a systematic programme of landslides, cyclone, flood and sea erosion hazard mapping for identification of hazards locations.
- 2 Identification of elements at risk on a national scale

(b) Mitigation plans at national and/or local levels, involving long-term prevention an preparedness and community awareness : and

Under the National Disaster Management Plan National, Provincial, District, Divisional and Hamlet level committees will be set up to prepare and implement prevention and mitigation activities and community awareness programmes

(c) Ready access to global, regional, national, and local warning systems and broad dissemination of warnings.

No significant effort has been made in this direction so far. Sri Lanka's experience, which is limited to local warning systems against cyclones and landslides is to be converted into a comprehensive national programme embracing all types of natural disasters, with ready access to global and regional warning systems.

2. Present national plan for natural disaster reduction

- (a) Time span covered** National Disaster Management Plan has been prepared. It will become operational only after passing the Sri Lanka Disaster Counter Measures Act in parliament. Time span covered is five years

(b) Agencies, Institutions, and Organisations involved.

1. Ministry of Reconstruction, Rehabilitation and Social Welfare.
2. Ministry of Policy Planning and Implementation
3. Department of Irrigation
4. Department of Coast Conservation
5. Department of Meteorology
6. National Building Research Organisation
7. Ministry of Lands
8. Ministry of Defence
9. Ministry of Health
10. Ministry of Labour

(c) Implementing Agencies

1. Ministry of Reconstruction Rehabilitation and Social welfare
2. Ministry of Policy Planning and Implementation
3. Department of Irrigation
4. Department of Coast Conservation
5. Department of Meteorology
6. National Building Research Organisation
7. Ministry of Lands
8. Ministry of Defence
9. Ministry of Health
10. Ministry of Labour

(d) Funds available for Implementation

Availability has to be examined

3. Legislation introduced and enacted in relation to natural disaster reduction

A Reconstruction and Rehabilitation Fund Act has been passed in Parliament to provide funds for reconstruction and rehabilitation activities. Legislation viz. Sri Lanka disaster Counter Measures Bill has been prepared and it will be submitted to Parliament for approval shortly.

4. Disaster Mitigation activities completed or underway

(a) Identification of hazard zones : hazard assessment

| | |
|-------------------------|---|
| Title of Project | Landslide Hazard Mapping |
| Status | The Project which commenced in 1990 with the UNDP assistance will come to fruition in July 1995. It is aimed at institution capacity building in the area of landslide studies and services. The other project outputs would include state of nature maps, integrated landslide hazard maps and data-base landslides. |

Participating institutions in the country and/or on the international level

National Building Research Organisation

Geological Survey and Mines Bureau

Survey Department

Marga Institute

University of Warwick, U.K.

Cost of Project

US \$ 2 million (Approximately)

Source of Funding

U. N. D. P.

Implementing agencies

National Building Research Organisation, Ministry of Housing and Construction - Government of Sri Lanka

Address (telephone and fax- number) of the agency in charge

RR UNDP, Colombo Fax 0941 581116

DG NBRO Fax -----

(b) Monitoring, prediction and warning

Title of project: Instrumentation, Monitoring and Forecasting of Landslides
for early warning

Status: This work is being carried out as a part of the UNDP
supported Landslides Hazards Mapping Project

Participating institutions in the country and/or on the international level:

NBRO

Costs of project:

Part of Landslide Hazard Mapping Project

Sources of funding:

Implementing agencies:

NBRO

Address (telephone and fax-number) of the agency in charge:

RR, UNDP Colombo Fax 0941 581116

DG, NBRO Fax -----
