RECENT EARTHSLIPS IN THE HILL COUNTRY - HUMAN IMPLICATIONS

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Earthslips like other natural hazards, attract the attention of the public and policy makers mainly due to their social implications. When the damage to life and property is less, earthslips remain often unnoticed except as a matter of scientific interest. Even today, if an earthslip took place in a remote forested area devoid of human settlements, it would not have been taken seriously by anyone except perhaps by a small minority of the scientific community. It could therefore be argued that the central issue of the problem of earthslips is in the spread of human settlements and agricultural activities to the earthslip prone lands.

HISTORICAL PERSPECTIVE

It is pertinent to evaluate the events that led to the catastrophic occurence of recent earthslips in the hill country areas from a historical perspective. Before the advent of plantation agriculture, human habitation in the hill country was largely confined to the valley bottoms where the staple food rice had been grown with water tapped from natural streams of the forest clad hills. Thus, Le Mersieur* in his 'Manual of Nuwara Eliya District' compiled in 1873 describes the intricate network of irrigation channels in the area around Hanguranketa and Walapone. Except for occasional forays into the hill slopes for chena cultivation, almost all agricultural activities were confined to the valleys or 'deniyas' which suffixed the name of the village itself as in the case of Gurudeniya, Peradeniya, Teldeniya etc. Earthslips in various parts of the hill country triggered off by heavy rainfall

* Le Mersieur (1873) Manual of the Nuwara Eliya District.

even during the histrorical periods were recurrent natural phenomena. However, the damage to life and property by such catastrophes should have been minimal due to their occurrence in areas outside the human settlements.

The spread of plantation agriculture in the mid 19th century can therefore be identified as the initial or the distant cause of the present problem of earthslips in the hill country. Thus, with the progress of plantation agriculture, persons such as Sir J D Hooker in 1873 and Trimen in the 1880s warned of the possible adverse consequences of indiscriminate felling of forests of the hill country for plantations. These beacons culminated in the convention which established that no cultivation should be permitted over an elevation of 5000 feet. This was subsequently incorporated in the Standing Orders to Surveyors and administrators and had been fairly generally observed upto the end of the colonial era.

As a remedial measure to ease landlessness in the hill country created mainly by the colonial land policy, alienation of State land for village expansion and highland colonization schemes began in the 1930s, particularly under the aegis of the Land Development Ordinance of 1935. There is hardly any doubt that this policy had some beneficial impact on the villages almost marooned by the tea plantations. However, many of these resettlement schemes have pushed the villagers to the vulnerable zone between the plantations and the villages. The records available since 1930, bear ample evidence to the frequent occurrence of earthslips in the highland colonies as exemplified by colonies such as Goodwood, Elangahapitiya nad Mahawewa.

PAST REPORTS ON EARTHSLIPS

The occurrence of earthslips in the hill country is not a new phenomenon, and the attention of the Government was drawn to this problem

on many occasions in the past. Thus, as far back as 1882, reference was made to this subject in a report by F B A Vincent of the Indian Forest Service which was largely instrumental in the enactment of the Forest Ordinance of 1885. Commenting on Vincent's Report, Gorrie observed in 1954 (nearly 70 years later) that 'if Vincent's recommendations had been fully and forcefully followed through, there would have been much less erosion today'.

Then in 1904, a Commission on Soil Denudation in the Kelani Valley recommneded that no land above 50% gradient should be cleared and this has undoubtedly helped to preserve parts of the foothill forests in the Upper Kelani Valley. Again in 1931, a Soil Erosion Committee was appointed comprising both officials and planters and their findings identified the cause for land degradation as poor land use practices. This Committee suggested a five year education programme at the end of which compulsion by legislation was proposed to be introduced, but these recommendations have never received the attention they deserved.

The most comprehensive report on earthslips was provided by Maclagan Gorrie, on 'Kotmale landslides and Adjoining River Catchments'.* This report scientifically diagnosed the cures of earthslips into three categories, namely (a) preventive, (b) palliative, (c) remedial. The list of recommendations made under these headings had been so comprehensive that there appears to be hardly anything new to add even today.

The unprecendented rains of 1947 over the hill country led to massive earthslips on hill slopes and floods in valley bottom lands. A large number of people were rendered homeless and consequently to be evacuated from the hazard areas and resettled elsewhere. This experience generated enough political interest to introduce the Soil Conservaton Act No. 25 of 1951 which vested considerable authority with the Minister

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* Sessional Paper No. XVII of 1954.

in charge of the subject. The Soil Conservation Act was implemented vigorously in the 1950s but received less attention since the 1960s.

The Kandyan Peasantry Commission of 1951 made specific recommendations regarding the need for 'scientific investigations on earthslip prone areas, the need for an effective control of deforestation, and the possibility of reforesting stream banks and afforesting patana lands'. Once again, it should be noted that these recommendations have not attracted the desired attention of the relevant authorities.

The Government Mineralogist and the Soil Conservation Officer have made several reports on the question of land degradation. Particular mention should be made of the reports by Mr C H L Sirimanne (Government Mineralogist) in 1950 and 1952. Similarly, a series of reports by the Soil Conservation Officer to the Government Agent, Nuwara Eliya dated 6 January, 1958, 14 August, 1958, 27 January, 1961, 14 December, 1970 and November 1978 represnetd only a few instances where reports have been made on this subject in recent times, without appropriate action being taken.

PROBLEM OF EARTHSLIPS - IS IT MAN-MADE?

The conditions which favour the occurence of earthslips may be perceived under two broad groups, (i) geological, structural, topographical and climatic features of an area over which man has hardly any control, (ii) conditions which have been imposed on the natural state of land by various forms of human activities such as irrational land use, destruction of watershed forests by fire or felling, destruction of natural water-ways and drainage lines, construction of roads and setting up of dwelling places in vulnerable areas. In the present paper, attention is focussed on the latter group in which the impacts are often found to be more difficult to quantify.

In considering the involvement of human activities as a factor

responsible for earthslips, one of the questions that arise is whether the intensity and frequency of earthslips have increased in recent times, due to the increase of population and resultant pressure on land. However, the assertion that there had been an increase is based more on qualitative information than on empirical data generated from scientific studies. The records of earthslips that have taken place in the historical past are scanty and often unreliable. The available records on the occurrence of earthslips are maintained by the Social Services and the Geological Survey Departments. It was only after 1947 with the establishment of the Social Services Department that some attempt has been made to maintain a record of damage to life and property due to earthslips. Where such damage was not significant enough to draw the attention of the Social Services Department, they have gone unrecorded.

One of the most devastating episodes of earthslips in the hill country was recorded in 1947. Since then, earthslips of a serious nature have been recorded in 1952 (Udahewaheta), 1957 (Pahala Kadugannawa), 1964 (Walapone), 1970 (Walapone), 1973 (Walapone), 1978 (Wegalla), Bulathkohupitiya), 1979 (Kuruwita, Akuranakande), 1979 (Bulathsinghala), 1981 (Pottapitiya, Yatiyantota), 1981 (Berawela, Aranayake), 1982 (Heenelipanakande, Mawanella), 1982 (Paginiwelakande, Patahewaheta), 1982 (Pathulpanakande, Pelmadulla), 1982 (Pitakande, Panasalatenna and Palindagama in Matale), 1983 Elangapitiya Colony, Mawanella), 1984 (Agalawatte), 1984 (Haliela, Badulla), 1984 (Liyangahawela, Bandarawela), 1984 (Ihala Andaluwela, Embilipitiya), 1984 (Bulutota, Kolonna), 1984 (Balangoda, Kuruwita), 1985 (Norton Bridge), 1985 (Nuwara Eliya), 1985 (Matugama), 1985 (Thiyambarahena, Warakapola), 1985 (Bodikulawa, Galagedera), 1985 (Penross Estate, Nawalapitiya), 1985 (Elapatha and Kohombakande in Ratnapura). Over one hundred and fifty people died and two hundred and fifty houses were damaged due to earthslips since 1970. Some 2495 families were affected by earthslips in Walapone and Hanguranketa A G A Divisions alone due to earthslips in January this year.

On the face of these records, it appears that over 60% of reported

earthslips have taken place after 1978. This does not necessarily mean that the incidence of earthslips has increased definitely from that year. It is possible that the Social Services Department had maintained better records in the recent past. However, it is evident that the incidence of damage to life and property due to earthslips has steadily increased over the years requiring the Social Services Department to intervene more frequently. This may be attributed to land use on steep slopes. In view of the established correlation between the earthslips and the heavy rains and poor landuse, it is difficult to subscribe to the view that the activities of the accelerated Mahaweli Development Programme had been the over-riding reason for the occurrence of recent earthslips.

LANDUSE ON THE WATERSHEDS

It is evident that chena cultivation has spread on to unstable slopes and the frequency of the cycling time of chena had proportionately increased with the growth of village population. Thus, landlessness and the poverty-crisis in the up country villages have forced the people to encroach on steeply sloping lands and grow cash crops such as vegetables and tobacco to earn their living, particularly in the recent decades. It is pertinent to mention here that considerable proportions of leaf supplied to the two major tobacco companies originate from farmers growing tobacco on chena lands and encroachments. Most farmers are not unaware of the fact that they are cultivating lands which are vulnerable to soil erosion and earthslips, but they do so due to the absence of other avenues to earn their living. It is doubtful whether environmental education or awareness alone will keep these people away from risky areas, because it is rational from their point of view to earn their living by one way or another.

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* See for example, Gamini Yapa 'Disaster in the Hills' - Lanka Guardian, March, 1985.

Tobacco cultivation is often considered the main cause of land degradation in certain hill country areas. It should be noted however, that many of the landslides that took place in the Maturata area in January 1986 were not directly associated with tobacco cultivation. Lands mostly affected were under vegetables, chenas and tea. In general, earthslips were observed on unstable lands on steep hill slopes used for agriculture, housing or road building purposes. Nevertheless, it is well known that soil erosion in areas under tobacco cultivation often assumes serious proportions. For example, in the lands of Maha Oya Catchments in Hanguranketa area, TAMS consultants estimated the soil loss to be in the range of 308 - 913/mt/ha/annum. Therefore, there is hardly any doubt that tobacco cultivation has to be discouraged on steeply sloping lands in the hill country for soil conservation purposes.

There are two major organisations sponsoring tobacco cultivation in the area around Walapone, Hanguranketa and Uva Paranagama, namely, Ceylon Tobacco and Intabex Companies. Ceylon Tobacco Company which has the larger share of tobacco lands has some 2500 hectares in the Walapone, Hanguranketa and Uva Paranagama A G A Divisions. A considerable proportion of these tobacco lands are located on steep slopes and encroachments.

The Intabex Company was incorporated in 1982 as a joint venture with Government participation. The Company took over some 700 - 800 ha of tobacco land mainly in the Badulla District. They also had tobacco growing lands in Nildandahinna and Walapone areas. At present, there are around 3500 farmers growing tobacco for the Company in some 695 ha of land.

The social consequences of any attempt to remove tobacco growers even from the most critical areas should be carefully assessed. Such an attempt is bound to affect the livelihoods of several thousands of poor rural families. It should be remembered that the present living standards of many villagers around Hanguranketa, Walapone etc. were reached only after the advent of tobacco cultivation. The Tobacco Companies are somewhat

reluctant to shift their cultivation area to the Dry Zone, where they have already opened up some considerable extents of tobacco lands. This is mainly due to the difference in the flavour of low grown tobacco compared with that of high grown varieties just as in the case of tea. In view of the discontent that would be created among the tobacco growers in the event of any attempt to resettle them in the Dry Zone, it would not prove to be a politically acceptable solution either.

Apart from chena and tobacco cultivation, occasional reference has been made to irrigation and terracing of paddy fields as possible causes of earthslips. It should be observed that both Walapone, Hanguranketa as clearly recorded by Le Merseiur (1893), were areas where irrigation and terracing had been practised for centuries. The type of irrigation practised in the hill country, where waters draining from the hill slopes are collected and conveyed to paddy fields may even have a mitigating effect on earthslips. Similarly, earthslips observed today are not often found on terraced paddy fields. It is in fact the poor maintenance of irrigation channels or bunds of terraces that could trigger off earthslips. The cultivation of paddy terraces right up to the banks of streams can of course lead to slumping.

The available information indicates that the large majority of earthslips in the hill country are debris or mud flows of a linear form. This shows the importance of maintaining stream reservations and the necessity to enforce the existing regulations as a matter of urgency. The encroachment of stream reservations in the tea estates continues unabated and seems to have even increased in recent years. It may also be relevant to note that in some instances - e.g. Welimada area and High Forest Estate, the brunt of improper landuse practices of the upper reaches of streams have to be borne by the users of land down-stream. This calls for rethinking on the delimitation of administrative divisions to make them compatible with the utilization of land and water resources. For example, in the case of Welimada area it would be desirable to use Uma Oya as the boundary between the Nuwara Eliya and Badulla Districts.

Hardly any quantitative assessments have been made to ascertain the impact of different types of land use on the occurrence of earthslips. There appears to be some reservation on the stabilising effect of forestry on steep slopes in view of the possible increase in infiltration of water through root systems, thereby enhancing the lubrication of soil masses. In general however, experiences in Sri Lanka (e.g. Ketayapatana) as well as abroad, adequately establish the fact that earthslip damages are less in forested areas. Thus, in the 'Katmandu-Kakani' area of Nepal which has some similarities with that of the hill country of Sri Lanka, Kienholtz et al (1983) concluded that:

> "Serious damages are clearly related to intensive cultivation especially in the steeep terrain of the Hill Zone. The forests of the Tareswar and Rani Ban ranges, however, with similar relief energy, rarely display damage due to erosion. Deforestation of steep slopes to provide additional land for cultivation resulting from the population pressure, is a major reason for the heavy losses from erosion".

It is also pertinent to note that certain reservations have been recently expressed on the maintenance of contour drains in the tea estates (e.g. P W Vithanage) for soil conservation purposes. Whether seepage from such drains would effectively contribute to slope failure is a subject that could be pursued by the scientific community, particularly in view of its significance in soil conservation strategies.

RESETTLEMENT OPTIONS

The past experience in rehabilitation of victims of earthslips, floods or other natural hazards, shows that the most favoured policy was the alienation of small blocks of State land as housing lots. Thus immediately after an earthslip occurs, if the damage to life and property is considerable, the district administrative machinery is activated and arrangements are made for the provision of food and basic amenities for

the victims on a temporary basis. Thereafter, the resettlement takes place on an ad-hoc basis within a few weeks or months. This process is often based on expediency rather than on a sound evaluation of long term consequences.

As far as the victims of the January 1986 earthslips are concerned they are located mainly in three districts, namely, Nuwara Eliya, Badulla and Matale. However, past records indicate that earthslips of a serious nature have taken place in at least four other districts, namely, Kandy, Kegalle, Kalutara and Ratnapura. Out of these seven districts, the largest number of earthslips had occurred in the Kegalle district according to information available to the Social Services Department.

In any endeavour to resettle the present earthslip victims, at least five broad policy options seem to be available: (i) to resettle them in the areas around their villages where suitable land is available, (ii) to relocate them in downstream Mahaweli Development areas, (iii) to absorb them into present plantations as employees depending on their vocational and educational backgrounds, (iv) to resettle them on uneconomical or marginal land released from the SLSPC and the JEDB for agricultural settlements, (v) to resettle them on acquired private lands in the neighbouring areas.

A large number of villages affected by earthslips are surrounded by plantations and it is only rarely that State land is readily available in the neighbourhoods. A considerable proportion of such State lands had been utilized for village expansion over the years. What is available, if any, falls into the category of 'marginal lands' with degraded soils or steep slopes. On such lands there are encroachments, chena cultivations, tobacco and vegetable plots. Some studies have been conducted by the Soil Conservation Division of the Department of Agriculture on the suitability of these lands for agricultural purposes and it is not on one occasion that efforts have been made to discourage particularly tobacco

cultivation. As noted earlier, there were numerous instances where village expansion and encroachment have contributed to make the slopes more unstable. The worst earthslip disaster at Katayapatana is not unrelated to the opening of a colony on the higher slopes above the village. Therefore, it is unlikely that lands are available around the villages in adequate extents to resettle the earthslip victims.

Under the accelerated Mahaweli Programme, new lands are being opened in several parts of the Dry Zone. Settlers for these lands are selected on the basis of a points system evolved to select the most enterprising farmer to get the best use out of the land given to him. A considerable proportion of such land in Systems H and C have already been alienated to persons evacuated from the Victoria, Kotmale and Randenigala Reservoir areas. The total number of families sent down to Mahaweli areas from the hill country during the last eight years exceeded ten thousand families. On the one hand a further addition of people who are not suitable to become Mahaweli settlers according to its own selection criteria can affect the Mahaweli programme in the long-run. On the other hand, a continued transfer of villagers from the hill country to the Dry Zone can also have certain adverse long-term geographical consequences. Therefore, the transfer of earthslip victims to downstream Mahaweli areas might not prove to be a prudent or viable policy.

As a result of repatriation of estate workers of Indian origin in the recent past, it is likely that in certain estates, vacancies may have occurred in the labour force. The relevant statistics are not readily available. Historically, the Sinhala villagers have displayed some reluctance to work in the tea estates as labourers which had been used as a reason for the import of Indian labour. With the increase of population pressure and landlessness and the resultant changes in social attitudes and the transfer of ownership of plantations to the State, more and more Sinhala villagers have opted to work in the plantations. Therefore, if there are considerable numbers of vacancies in any estates near the affected

villages it would be desirable to absorb the earthslip victims as employees in such estates.

The alienation of blocks of uneconomical estate lands of the J E D B and S L S P C provides another avenue for resettlement of earthslip victims. Firstly, there is the question of availability of such lands. With the increasing prices of plantation crops, marginal lands tend to become more economic and therefore, some of the State agencies would prefer to retain such lands for future development. On the other hand if small housing lots are given to the affected families in these areas they will not be able to earn their living from such lands. Information on the extents of marginal land available is also not very complete. The Land Use Policy Planning Division of the Ministry of Lands has made some attempts to estimate marginal lands in the Nuwara Eliya District and found that some 4600 ha of such lands are suitable for perennial crops. The release of this land may be obtained where feasible from the relevant authorities, and passed on to the earthslip victims for redevelopment. However, it should be emphasised that the units of allocation should be economic. In the case of Nuwara Eliya District, an economical unit should be at least half a hectare, if settlers are to be kept above the poverty line. It has also been estimated that the resettlement of each family would cost around Rs.65,000/= of which Rs.40,000/= is set apart for compensation to estates and displaced workers.

The acquisition of private lands should be done as a last resort in the search for land to resettle earthslips victims since it can cause much inconvenience and pain of mind to the owners when it is not voluntary. It should be noted, however, that there are considerable extents of neglected private lands in many hill country areas. If it becomes necessary to acquire land for resettlement purposes, it would be desirable that only such neglected lands be acquired. In any event, if circumstances demand recourse to acquisition of private land, adequate compensation should be paid to the owners without delay.

SUMMARY AND CONCLUSIONS

Earthslips provide only one facet of the problems of land degradation which cannot be treated in isolation. Deforestation of watersheds, soil erosion, siltation of reservoirs and the occurrence of floods are other manifestations of the same phenomenon. Therefore, it is necessary to treat the general problem of land degradation in its totality. The core of the problem of earthslips is found in the spread of human settlements and agricultural activities to steeply sloping lands and other vulnerable areas.

A programme of evacuation of people resident in high risk areas and resettling them in safer locations in the hill country should form part of the watershed management plan and such resettlement activities should not be done haphazardly under crisis situations. Out of the available resettlement options priority should be given to the settlement of people on uneconomic tea lands and absorption of them into the plantation sector. The unit of alienation of marginal plantation lands should be of sufficient size to enable an average family to earn a living from it. Some estimates indicate that at least half a hectare of land is needed to maintain a resettled family above the poverty line.

Tobacco Companies should be encouraged to shift their activities from the hill country to the Dry Zone. Adequate incentives should be provided to them to open new plantations in the Dry Zone including Mahaweli Development areas.

Action should be taken to maintain irrigation and drainage works in the hill country, in proper condition, particularly in areas around Hanguranketa, Walapone and Welimada. A redefinition of administrative boundaries may be needed in order to optimise the use of available land and water resources.