

**GEO-ENVIRONMENTAL HAZARD AND SUGGESTED LANDUSE MAP OF SHILLONG URBAN COMPLEX. MEGHALAYA (URBAN LEVEL)**

Source - Geological Survey of India

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#### Geoenvironmental Hazards

- Areas Deforested
- Construction of Houses on slopes > 15 deg.
- Portion of Shillong bye-pass alignment along slopes > 15 deg.
- Stone quarries located along nala banks.
- Areas of rill and gully erosion.
- Areas prone to landslide
- Areas of flash flooding

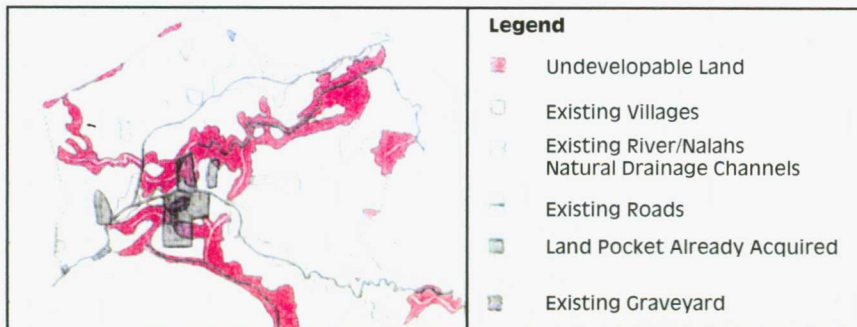
#### Land Use

- Areas suitable for future expansion of town
- Sparsely forested areas for further afforestation.
- Areas suggested for afforestation.
- Proposed shillong bye-pass alignment.
- Parking lots
- Parking lot proposed to be constructed
- Proposed bus terminus
- Garbage dumping sites/main garbage disposal site.
- Alternative sites for final garbage disposal.

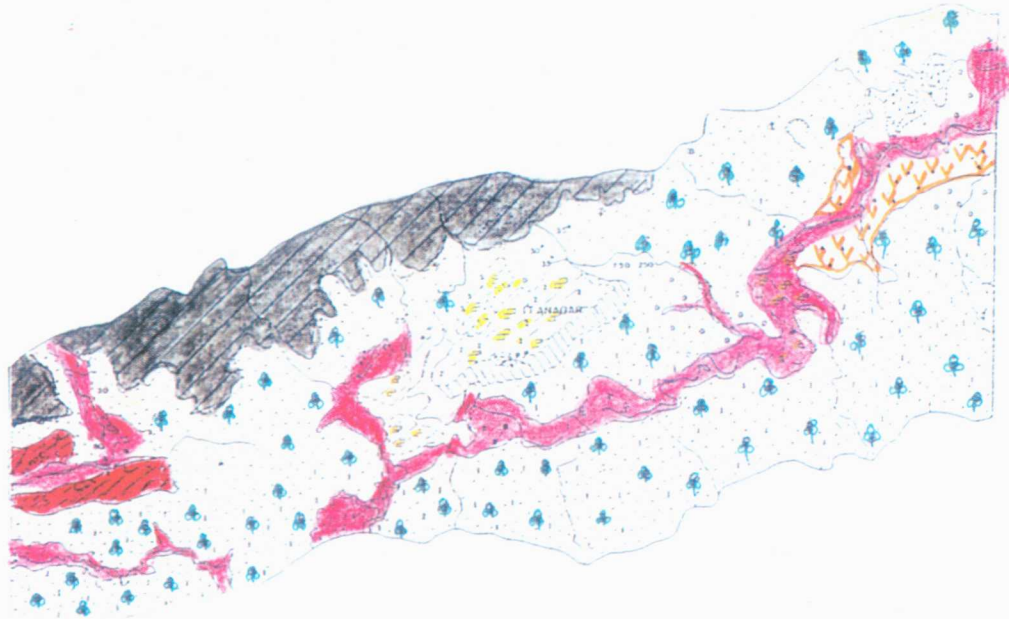
#### Other Features

- Potential ground water areas
- Location of spring
- Tyrsad-Barapani Shear-Z
- Lneaments
- Escarpments
- Master Plan Boundary
- Spot height/Triangulation Station

### New Shillong Town



25% of the new town contains of high slopes and natural drainage network. The challenge lies in conserving this area, and yet making the project financially viable.



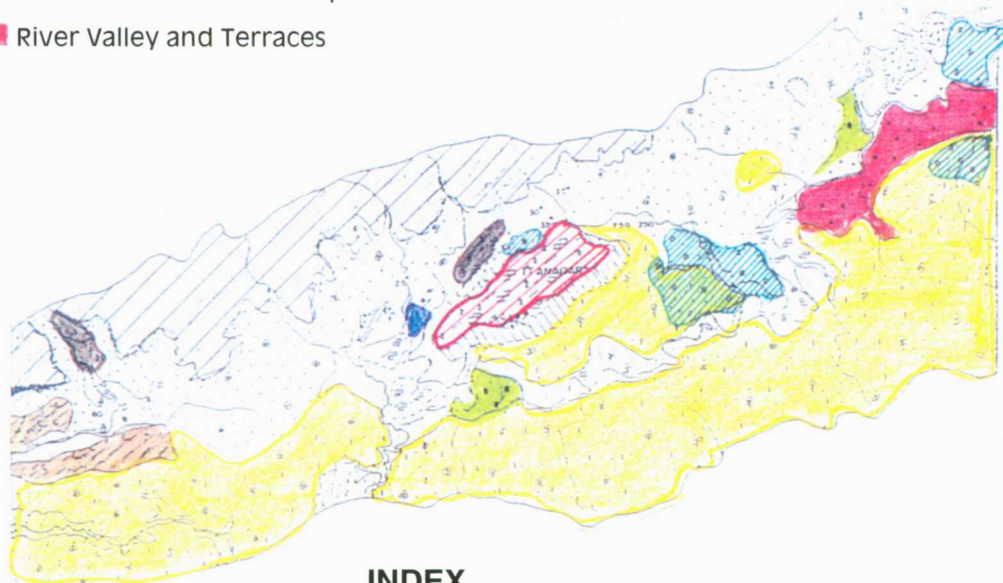
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**LANDFORM**

- High Hills
- Moderately High Upland
- Flat Topped Hillocks, Piedmont and Cuesta Slopes
- River Valley and Terraces

**LANDUSE**

- Urban Built-UP
- Rural Settlement
- Mixed Natural Forest
- Cultivated Areas



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**SUGGESTED LANDUSE**

- Area Suitable for Urban Expansion
- Area Suitable for Agricultural Activity
- Area Suitable for Horticulture
- Area Requires afforestation

**ENVIRONMENTAL HAZARDS AREA PRONE TO**

- Dendritic Gullying and Slumping
- Sheet Erosion
- Landsliding and Slope Failure
- Flooding

**GEO-ENVIRONMENTAL APPRAISAL OF PART OF ITANAGAR CAPITAL COMPLEX, ARUNACHAL PRADESH (URBAN LEVEL)**

Source-Geological Survey of India.

particularly on slopes more than 15 degree, deforestation and faulty waste disposal has led to excessive soil erosion, river siltation, water scarcity and air pollution. The study has indicated five alternative sites for the future expansion of town in addition to areas for forestation, potential areas for availability of ground water and conservation of aquifer. However, keeping in view the traditional land ownership pattern, it is a very difficult task to acquire the land in the suggested areas, for enabling the shift of population/future growth to the safer areas. HUDCO is making significant contribution, by way of promoting safe and sustainable cities/new towns in hilly regions, through its technical assistance/consultancy efforts.

A similar geo-environmental appraisal of the capital city of Itanagar in Arunachal Pradesh has also indicated various environmental hazards around the capital complex.

The study has identified the areas of active gully erosion, sheet erosion, land slides and flash flood prone areas in and around the existing Itanagar town, which is craving for viable corridor for expansion and growth. The study has further identified the probable area for the construction of new the extreme east of the existing town wherein the slope of the land, the soil and the availability of the ground water is favorable. The economic viability would force the town development authority to expand the existing town in the areas which are close by, taking the advantages of the existing infrastructure already laid. **However, the environmental studies are indicating a location, which is far away from the existing town. These conflicts are needed to be resolved so that a compromise solution can be arrived.**

### **Tolerance and Suitability of Environmental Features to Development**

The planners are becoming aware that system analysis of the total environment and its processes need to be a part of the overall planning process and that efforts to maintain or improve environmental quality and disaster reduction ought to be given sufficient weightage in making development decisions. Mr. MCharg, a leading environmentalist, has suggested that the data with regard to various parameters should be collected in sequence such as climate, geology, physiography, hydrology, pedology (soils), vegetation, wildlife and landuse. He further indicates that such type of data follows logically from the proceedings. An understanding of climate and geology helps explain the nature of the region's physiography. Similarly an understanding of physiography helps to explain hydrological patterns including drainage patterns, rivers and flood plains and underground water resources. The understanding of the natural process will help to explain the pattern of land use. A reference framework (developed by Michael J. Meshenberg) of systematically analyzing the data of the environmental inventory for use in developing a plan has been found extremely useful. It provides: (1) a description of selected environmental features; (2) a brief discussion of their tolerance to, and sustainability for, development with respect to their ecological role, usefulness and potential hazard to man, uniqueness and vulnerability; (3) examples of types of uses and scale of development compatible with each feature, (4) examples of development restrictions which might be applied to sustain the natural processes or avoid creating hazards

### **Need for Geographic Information System Applications**

The geo-environmental appraisal at present is being done at the district level and the vulnerability atlas prepared by the Ministry of Urban Development is also giving an information on the state and the district levels. In order to enable the local planning authority or the district authorities, to take appropriate decision, it is necessary to collect the information pertaining to various environmental features at the micro level. The satellite imagery can help us to produce the requisite data on regional landuse, vacant land, drainage pattern, degraded land, water bodies, tanks and ponds, wastelands, salt affected lands, water logged areas, eroded lands including the existence of gullies and ravines, and the areas wherein natural hazards have already taken place.

Through remote sensing, the data can be collected faster, and is cost effective and accurate, compared to conventional methods. In order to understand the impact of the development or the changes taking place in the local ecology, it is necessary to measure the same on time series. It can also be used for disaster prevention, as a tool in the multi hazards, risk assessment analysis and map preparation. GIS can be used for preparation of multi layered maps co-relating geological, hydrological and land use data which can be used to identify areas where due to environmental degradation the risk of natural hazards is higher. Thus it can be an effective tool in planning for disaster prevention.

### **Sum up**

To sum up, the problems of human settlements in the mountainous regions are those of imbalances in growth patterns, environmental degradation, deforestation, lack of effective means and transportation, high cost of construction and development, lack of essential services like water and sanitation coupled with low affordability, economic backwardness, lack of entrepreneurship and slow process of social change. The occurrence of natural disaster further weakens the capacity of the hill regions. Some of these issues can be analyzed in detail, in isolation, but in order to find a solution all these factors have to be considered together under a comprehensive framework. This makes it imperative that the relationship between sustainable environmental planning for hill areas and natural disaster reduction be recognized. Risks can be reduced only if they are systematically analyzed and policy designed to reduce them through the planning process. This has to be accompanied by the willingness of the government to implement these measures and awareness of the local community to help sustain these policies at the ground level. It is seen that the local planning authorities are competent enough to deal with these issues within their jurisdiction under the law but outside the same in the region, the environmental protection is no body's agenda and therefore, proper institution development, which can address these issues, is required. In addition to this there is also need to revise town and country planning acts, from the point of view of natural disaster and also significant efforts are required to be made, to make master plans effective and implementable. National level disaster reduction and prevention program based on geo-environmental risk assessment will be the need of the next millenium not only in the hill areas but in the entire country.

*"The balanced use of material resource will be hard to achieve for a society that lacks belief in non-material ends"*

*Jonathan Benthall: Discussion of Ecology and Art*