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Geomorphic Mapping: A tool for Planning and Development

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Abstract - Among the various types of maps geomorphic maps are one of quite useful map. Geomorphic mapping can be considered in two distinct techniques. One which depicts geomorphological characteristics of the region in the pictorial form while the other is conversion of geomorphic information which can be used for variety of purposes such as planning and management needs. In recent works of geomorphology, environmental planning and watershed managements etc. the geomorphic maps are very little used. The uses of geomorphic maps are different. Present paper attempts to explore various applications of geomorphic mappings. It is used to show the man made features such as quarries, embankments and the changes occurred in landscapes due to human intervention. It is also used to understand various features and the contemporary processes operating in the region. These maps can be used for environmental management. For different purposes different geomorphic maps can be prepared based on the needs of the applications of geomorphic information.

Keywords - Geomorphic Mapping, Planning, Development, Tool, Environment Management.

I. Introduction

Map is an essential tool of geographical study. Maps are used not only in geography but they are also used in various other subjects directly or indirectly. In almost all the branches of earth sciences use of maps is common. Among the various types of maps geomorphic maps are one of quite useful maps. Geomorphic maps are the special type of maps in which geomorphic characteristics and processes are shown. In geomorphic study maps of features, processes operating on the land surfaces and the material maps are prepared.

There are several types of Geomorphological maps. Apart from the distinction which may be made between maps drawn for academic purposes only, and those compiled between morphographic, morphogenetic, morphometric and morphochronologic maps.

Geomorphic mapping can be considered in two distinct techniques. One which depicts geomorphological characteristics of the region in the pictorial form while the other is conversion of geomorphic information which can be used for variety of purposes such as planning and management needs.(Cook,1974). These maps can be used either in general geomorphic study or for special purposes such as land use, agriculture and forestry, prospecting and exploitation of mineral resources and civil engineering. (Demek, 1972 cited in Cook and Doornkamp, 1974).

The interest of work on process mechanisms, and the declining trend of spatial tradition in geography, have pushed geomorphic mapping to the periphery of academic concern, though it is an important part everywhere in applied work (Goudie, A. S. 1990). In recent works of geomorphology, environmental planning and watershed managements etc. the geomorphic maps are very little used. Present work is an attempt to highlight the applications of geomorphic mapping. These maps can be used to understand various features and the contemporary processes operating in the region, for environmental management. It also can be used to show the man made features such as quarries, embankments and the changes occurred in landscapes due to human intervention. For different purposes different geomorphic maps can be prepared based on the needs of the applications of geomorphic information.

The study of landform distribution is an important aspect in geomorphology, which helps us to understand the past and present processes. The study also leads to the recognition of characteristics of an area that varies across an, or are always found in association with each other. Besides, the location and spatial patterns, the dimensions of a particular feature may be important in a planning and development project. In short a map of the relevant landform, material and processes is an effective aid in many environmental management problems. For the application of geomorphic maps various methods through out the world were in practice. Some of these methods are can guide us to overcome today's problems (Tricart, 1965).

II. Various Applications of Geomorphic Maps

For our needs we should prepare our own scheme of geomorphic mapping and we should use signs and symbols according to our need. While preparing geomorphic map of Kas plateau and beach map along Konkan coast we found some problems of using symbols. For particular features no symbol has been used in any of the previous schemes. Since the mapping is an essential part of geomorphic study our own scheme of symbols can be developed. Present work is an attempt to highlight the uses of geomorphic mapping in various fields with the help of some case studies:

1. A map for the development of township was prepared with G.P.S. and theodolite near Velane village. Besides preparation of simple boundary map an addition of contours with an interval of two meters made it easy to plan the area. Overall cutting and filling was planned by the engineers

and the estimation for the earth work was calculated very easily. Presence of stream in the same area has also marked with area not suitable for filling.

2. Preparation of geomorphic map for the study of features, processes, material and their distributions. The Kas plateau area is an extensive flat surface. From the topographical map it seems that the plateau surface is featureless but after the study of the area and geomorphic map we can understand the effects of the processes operated in the past and processes operating today. With the help of the analysis of the past and present processes the change in the environmental conditions can be inferred. For the same area the material and/or feature map can give us an idea of variations in the processes and the features, change in climatic condition.

III. Uses of Geomorphic Maps

Applications of Geomorphic maps in planning and economic development:

A) Land use	1) Territorial planning 2) Regional area planning 3) Conservation of the natural and cultural landscape.
B) Agriculture and forestry:	1) Potential utilization 2) Soil conservation 3) Soil erosion control 4) Reclamation of destroyed or new areas 5) Soil reclamation
C) Underground and surface civil engineering:	1) Reconstruction and re-planning of settlements, especially of towns designing of industrial buildings. 2) Communications (roads, railway, canals, harbors) 3) Hydro-engineering: a) Reservoirs and dams b) Regulation of rivers c) Natural and artificial waterways d) Irrigation canals) Harbor construction. f) Shore protection g) Fishing projects.
D) Prospecting and exploitation of mineral resources:	1) Prospecting 2) Geological survey 3) Exploitation 4) Mining 5) Potential and actual damage done by mining 6) Reclamation of abandoned opencast mines 7) Landslip areas and regions of subsidence due to mining 8) Reclamation of areas destroyed by mining and waste dumps.

Source: compiled by: Cook, R.U. and Doornkamp, J.D. (1974), originally from Demek (1972)

If we consider only slope aspect of land surface we can find out different types of information such as slope angle, nature of slope, slope direction etc. The uses of such information of slopes and contemporary processes operating on the slope units (Darlymple, et.al. 1968) their effects on the surfaces etc. with the help of contour map the slope direction and angles can be shown, it is called slope aspect. The information of slope direction and angle helps us to know the variation in slopes along one line or the profile.

From first example it becomes very easy to study and understand the geomorphic characteristics as well as the contemporary processes operating in an area. Geomorphic map of Kas plateau area shows

various geomorphic features with the major processes operating on the surfaces and with the help of the material present on the surface it can also be confirmed. The inferences from the geomorphic map later can be grouped in to various categories based on the requirement. For instance in the development and planning of an area the geomorphic map may minimize the cost of development of the area. For example in the road construction, the reconnaissance survey is carried out. If the process and material map is available to the engineers, the survey work will become easier to identify the slopes and the areas to be cut or fill. The source areas of material supply for the land filling or embankment can also be found out.

IV. Conclusions

From the case studies it is very clear that, the applications of geomorphic maps are vivid. Preparation of base map for various development programs can be based on geomorphic maps. The maps of slopes and processes can be grouped based on the requirements. The mapping of various features will certainly help not only to the learner of physical geography but also for the planner and developer. Since the applications of geomorphic map are wide, we should do some efforts towards maximum uses of geomorphic map and we should cover as much area as possible under the series of geomorphic map.

V. References

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