06

WK 06 037-328

MONDAY
FEBRUARY
2017

FEBRUARY 2017

M	T	W	T	F	S	S
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6	7	8	9	10	11	12
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27	28					

Applied Geomorphology

The application of geomorphic understanding

→ to do analysis

→ find the solutions of problems

These problems are caused by → human activities (irrational exploitation / utilization of natural resources.

due to interaction between

→ human activities

→ Geomorphic system

→ environmental system

objective → Pick out — current problems

If everyone is moving forward together, parallel with each other then success takes care of itself.

Applications of geomorphology

Social significance

Prompt decision making

Impact assessment & Management (Identify the regions & prevent losses.

Application of geomorphological techniques

1. Resource evaluation & Managmt
2. Socio economic developmt.
3. Mitigation of natural hazard & disaster management.

How ?

By mnitoring the changes in landscape characteristics & geomorphic system caused by human economic activities.

07

WK 06 038-327

TUESDAY

FEBRUARY 2017 (impact)

MARCH 2017

M	T	W	T	F	S	S
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MAR APR MAY JUN

If u cannot work with love but only with distaste, it is better that you should leave your work.

08
WK 06 039-326
VEDNESDAY
FEBRUARY
2017

EBRUARY 2017
T W T F S S
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8

The intentional effects of human economic activity on geomorphic form & process:—

→ Land Use changes

Cleaning of forest, terrain modification by Engineering Works, Mining & oil drilling.

Leads to:- Soil erosion, recurrent floods, Slope failure due to engineering activities, effect of hydraulic geometry due to change of river load by dams.

unication
human
nection
e key to
nal and
success.

On the other hand planned effect of man's activities can be done

Channel manipulation (embankment Construction)

Constructions :→

protect coastal areas from wave erosion

Morpho — agricultural. Regimalisation

Preparation of Natural hazard maps.

Urban planning in different Geographic environment.

09

WK 06 040-325

THURSDAY

FEBRUARY

2017

MARCH 2017

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10

WK 06 041-324

FRIDAY
FEBRUARY
2017

FEBRUARY 2017

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Applied Geomorphology & environment.

→ It deals with the impact of natural processes on humans & vice versa.

→ Vulcanism, floods, droughts, landslides, impacts human & get impacted by human activities

→ There is influence, control & application of geomorphological characteristics on land use & agricultural planning.

→ Role of geomorphology in management of land & water resources in arid environment.

→ Role in the exploration & planning of water resources in desert areas. (eg India Gudiwad)

→ Helps in predicting natural geomorphic hazard.

→ Applied Geomorphology

↳ Ga Hydrology.

11

WK 06 042-323

SATURDAY

FEBRUARY

2017

MARCH 2017

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SUNDAY 12

Nothing is to high for a man to reach, but he must climb with

13

WK 07 044-321

MONDAY
FEBRUARY
2017

EBRUARY 2017

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Surface water, groundwater.

→ helps in locating rich groundwater Reserves.

Eg: Carbonate rocks (limestone)
" these are highly porous.

→ helps in location of areas to do infrastructural work.

→ Aquifers with sand contain large groundwater

eg: Ganga plain.

known as compound stalagmites.

Environmental and Applied Geomorphology :

Generally engineers and geologists are more concerned about the environmental and other related problems. Here we would try to concentrates on some of the applications of geomorphology to the types of problems that are commonly encountered by geologists and engineers.

(i) **Hydrology of Limestone terrains**— Hydrologic problems in limestone terrains are best understood when the geomorphology of such areas is fully understood. Permeability in limestones is in part primary and in part secondary or acquired. Primary permeability is dependent upon the presence of initial interconnecting voids in the calcareous sediments from which the rock was formed. Secondary or acquired permeability results from joints and fractures produced by diagenetic and diatrophic processes and from openings created by solution along joints and bedding planes. Obtaining water from wells in a limestone terrain may be easy or difficult. If the

limestone has great-primary permeability, to which has been added secondary permeability in the form of solutional openings, there may be no difficulty in obtaining wells of large yields. If the limestone is dense, with less permeability movement of ground water will be largely through secondary openings. Under these conditions, the obtaining of a satisfactory well to a large degree depends upon chance intersection of one of the solution ways through which the ground water moves. Such wells, even if yielding satisfactory quantities of water, are subject to the possibility of contamination, if sandstone is mining there.

(ii) **Ground water in glaciated areas**—Recognition of the possibilities of large supplies of ground water from glaciated areas largely depends upon familiarity with the types of deposits from which large yields can be obtained, along with an understanding of the geomorphic history of the area during which perglacial and glacial period existed. Outwash plains, valley terrains, are the places which are likely to yield large volumes of water. Most tills are poor aquifers because clay is found inside this structure but they contain local lenses of sand and gravel which may supply enough water to meet the domestic needs. Surface topography rarely gives a clue to the existence of such water-bearing lenses, but they are likely to be more abundant in areas adjacent to lines of glacial drainage and they commonly are elongated in the direction of glacial movement. It is also generally accepted that buried pre-glacial and interglacial valleys are the sources of large volumes of ground water. Recognition of their presence within an area depends upon the detailed study of perglacial topography and geomorphic history of the area. Location of buried valleys is done by constructing bedrock topography maps of glaciated areas.

(iii) **To detect the ore bodies**—Many of the ore bodies have an obvious surface expression in the form of outcrops of ore, gossan, or residual minerals or such structural features as fractures, faults and zones of breccia. For example—At Santa Barbara, Chihuahua, Mexico, Massive quartz veins stand out conspicuously because they are much more resistant to erosion than the unsilicified country rock.

Topography may be helpful in searching for iron ore. The iron ore deposits of the Lake Superior region are very much associated with the hills or ridges of that region. Residual iron depo-

its are the results of concentration of iron during periods of weathering and thus old erosion and weathering surfaces are favourable sites for their accumulation provided these are present beneath surface rock types which make possible a concentration of iron oxide.

(iv) **Weathering Residue**—Several important economic minerals are essentially weathering residues of present or ancient geomorphic cycles, and in its reach geomorphology can play an important role. It can help in search of clay minerals, calcite, bauxite. Some manganese and nickel, ore and other ferrous minerals.

Unconformities in the landforms represent ancient peneplain surfaces and these are the locations which contain certain residual minerals. More commonly such minerals are to be found upon remnants of tertiary erosional surfaces above present base levels of erosion.

In the formation of bauxite generally two modes of its origin are more prevalent (a) In which the bauxite represents the residue of an exceedingly small amount of insoluble aluminous material in limestones and dolomites and

(b) In which it is the direct product of the weathering of aluminous minerals.

Here in both the cases, bauxite is a weathering residue.

The phase of geology which concerns itself with the recognition and study of ancient weathering surfaces and soils has come to be known as paleopedology. It is still in its infancy but it offers important possibilities in the search for the type of mineral deposits herein designated as weathering residues.

(v) **Epigenetic minerals and unconformities**—Epigenetic minerals are those minerals which are younger than the enclosing rocks. Numerous deposits of epigenetic minerals are associated with ancient erosion surfaces. Mills and Eyrich found evidence of an association of mineral deposits with unconformities in 68 minerals in the United States and Canada. Some uranium deposits seems to be associated with unconformities.

(vi) **Geomorphic principles applied to placer Deposits**—Placer deposits of minerals result from definite geomorphic processes, are found in specific topographic positions, and may have a distinctive topographic expression. Some placer deposits for example are colluvial, aeolian, bajade, beach, glacial etc.

Geomorphic principles can be applied to the search for gold after the buried channels have been properly identified. Gold placers are likely to be richest where there was slowing down of stream velocity.

(vii) **Application of Geomorphology in Highway Construction**—Topography plays an important role in determining the most feasible highway route. Different types of terrain impose varying problems in engineering. A route over a karst plain necessitates repeated cut and fill, otherwise the road will be flooded after heavy rains as sinkholes fill with surface runoff. Bridges in the Karst region should be so designed so that they may not be weakened by enlarged solutional cavities which are likely to be present.

Landslide and other types of mass-wasting present problems in the construction of highways. In highway construction, the nature of the soil beneath a road surface has become increasingly significant because of its control over the drainage beneath a highway. Pumping which is the expulsion of water from beneath road slabs through joints and cracks helps to displace water carrying up soil particles. Thus creating a void beneath the pavement, which in turn resulting in cracking of the pavement.

(viii) **Location of Sand and Gravel Pits**—Selection of suitable sites for sand and gravel pits enables evaluation of geologic factors such as variation in grade sizes, lithologic composition, degree of weathering, amount of overburden, and continuity of the deposits. Sand and gravel may be found in flood plains, river terrace, alluvial fan and cone, glacial deposits and other such features. Terraced valley trains and outwash plains are usually favourable sites for pits because they do not have a thick overburden and usually are extensive.

(ix) **Dam-site selection**—Application of geology to damsite selection involves a synthesis of knowledge concerning the geomorphology, lithology and geologic structure of terrains. In the limestone region leakage is the main problem associated with Dams. A construction in a valley is desirable from the stand-point of the size of the dam that will have to be built. But in glaciated areas, where buried bedrock valleys containing sand and gravel pills are common, surgical topography may not give an adequate picture of sub-

surface conditions it may lead to the loss of water due to leakage problem.

(x) **Application in military geology**—Informations about the kind of rock that would be encountered in digging trenches, in mining and countermining and the possibilities of water supply and supplies of other geologic materials can be helpful for the military people. Topography did play a role in maneuvering and planning routes of attack. This has led to development of terrain analysis of the region which can reveal about the origins and tell much about the underlying bedrock geology and structure as well as soil and vegetation of a region.

(xi) **Application of geomorphology in oil exploration**—Numerous oil fields have been discovered because of their striking topographic expression. Probably most of the domes and anticlines which have striking topographic expression in the form of concentric strike ridges and valleys may be a source of oil deposits.

Departure from the general drainage pattern are also indicative of change in the regional structures. This should be quite extremely investigated for any kind of deposit. According to Leverson some oil and gas pools are associated with unconformities hence a petroleum geologist must deal with buried landscape. The production of oil on the northeast flank of the Williston Basin in Manitoba and Northern Dakota is associated with an unconformity between rocks of Mississipian and Triasic age. The oil has accumulated below this unconformity on or near the crests of buried cresta ridges.

OBJECTIVE QUESTIONS