Introduction to GIS

Teacher: Dr. Atta-ur-Rahman Course: Geographic Information System Lecture 10

APPLICATION OF GIS

Canada was the pioneer in development of GIS as a result of innovations dating back to the early 1960s. Much of the credit goes to Roger Tomilson for the early development of GIS. Although the field of GIS has been around for the last 25 years the real potentials have become apparent only since the late 1980s. Afterwards widely used in USA, Canada & Western Europe.

Some typical examples of GIS applications are;

- land-use planning and management e.g. Cadestral mapping, Urban growth, Landuse changes etc. S.O.P, SUPARCO, P.D.A, C.D.A, P.E & D)
- oil & mineral exploration (O.G.D.C, Oil companies, P.G.S)
- environmental impact studies
- management of water resources (IIMI, AKRSP, WAPDA)
- natural hazard mapping (FFC, NESPAK)
- forestry and wildlife management (FMC, PFI, AKRSP)
- soil degradation studies (Soil survey of Pakistan)
- monitoring desertification
- agricultural development

• socio-economic survey and mapping (S.O.P & Primary education project in NWFP, Baluchistan, Sind, N.As & A.K.)

Applications of GIS

- Natural Resources' Applications
- Environmental Applications
- Socioeconomic Applications
- Management Applications

Sample GIS Applications

- Land-use planning and management
- Mineral exploration
- Environmental impact studies
- Management of natural resources
- Natural Hazard Mapping
- Forestry and wildlife management
- Soil degradation studies
- Monitoring desertification

Buying a new House

People from all over Nepal are migrating into Kathmandu valley looking for jobs. After some time, they think of buying a piece of land and building a house.

With the rapid urban expansion in the valley, it is getting more difficult to find good places for living. The first thing is to find a suitable land. People have their own preferences, but there are common issues which are discussed below.

The land should be such that the basic infrastructure such as road, water, electricity are close enough. In Kathmandu, all the facilities like water and electricity are dependent on the accessibility to road.

The area should not be close to rivers to be safe from floods.

Besides, it should be also be safe from natural hazards like land slides. Hence the land should not be in steep slopes.

Suitable Area for Residence





The figure shows an example of optimum paths based on minimum distance. In the figure, there are locations of number of main hospitals within the ring road of Kathmandu valley. If there has been an accident out of ring road (let's say: close to Bhaktapur), which is the closest hospital and the shortest route to that hospital for a ambulance. The network analysis identifies the closest hospital (Bir Hospital as you notice in the figure) in terms of distance and also indicates how to go there.

To find out the area that are most likely to be effected by floods ...



To find out the area that are most likely to be effected by floods, let's demarcate the area within 50, 100 and 150 meters from these rivers. This will look like....

Now, if we want to make some plans to improve the scenario, we need to involve the local bodies such as the ward offices.

We should identify the stakeholders – the wards falling in these flood prone areas, and the households that are affected by the flood.

Finding out on which wards these areas fall



Looking closer



Finding out the details....



Selecting the buildings within 50 meters from the river



What we have done in this case is that we looked at rivers, wards and households and related them based on their locations. This is called **spatial reasoning**.

For this, we used a lot of maps or "spatial information".

HOW G.I.S. WILL ANALYSE THE DATA

Example: Selection of waste disposal site for Peshawar city under the following conditions

- The selected site should be located within 20 km distance from the city center, but farther than 300 meters from any existing built-up area.
- 2. The site should be located on clay-rich soils, with a maximum thickness of 5 meters and clay content greater than 50%.
- 3. The site should have an area of at least 2 hectares. (Continue....)

HOW G.I.S. WILL ANALYSE THE DATA

Example: Selection of waste disposal site for Peshawar city under the following conditions

- 4. Should have an area, which do not have an important economic or ecological value.
- 5. Site should be located on a terrain with slope less than
 20 degree to prevent erosion and to assure accessibility.
- 6. Should be free from active landslides.

HOW G.I.S. WILL ANALYSE THE DATA

Following data are available for data input

- a. Contour map indicated in degrees
- **b**. Landuse map
- c. Road map
- d. Slide map with landslide distribution
- e. City map
- f. Geological map

FORMULAS WILL BE USED AS

Lslide=iff((slide="dormant")or(slide="active"),1,0) Luse=iff((landuse="barren")or(landuse="forest"),1,0)

