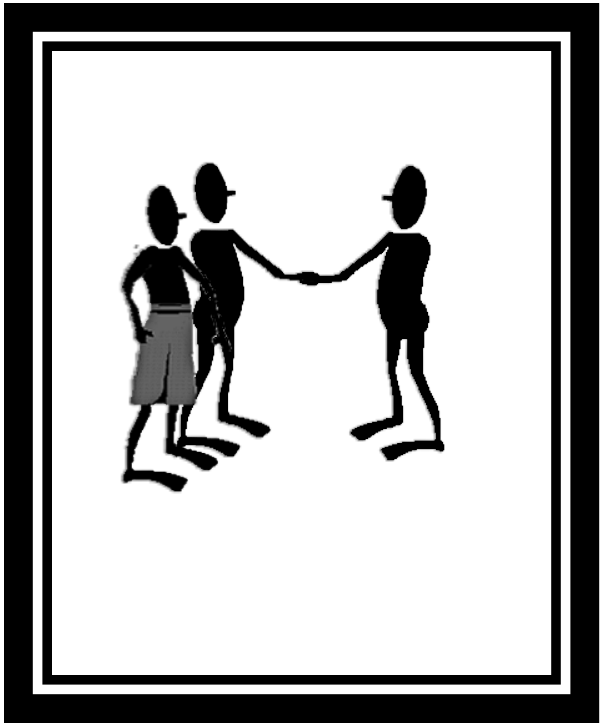

Geospatial analysis and optimization for prospecting plant resources in cold desertic areas of Jammu & Kashmir

Introduction

- India is endowed with a rich wealth of medicinal plants. These plants have made a good contribution to the development of Indian pharmacy.
- Medicinal and aromatic plants are mainly associated with different parameters ,like elevation, slope etc.
- Ladakh, rich in Biodiversity, has lot of species under explored or unexplored.
- Many tasks associated with the plant resource prospecting, exploration is difficult due to inaccessibility and time consuming as well.
- Optimized exploration needs broad spatial /regional understanding and innovative enthusiasm.



Research Scope

- Large Area :around 51900 km^2.
- Vegetation is an Important Economic Resource
- Medicinal and Aromatic plant resources.

Research Challenges

- High Altitude
- Terrain Complexity.
- Few roads.
- Time consuming process.

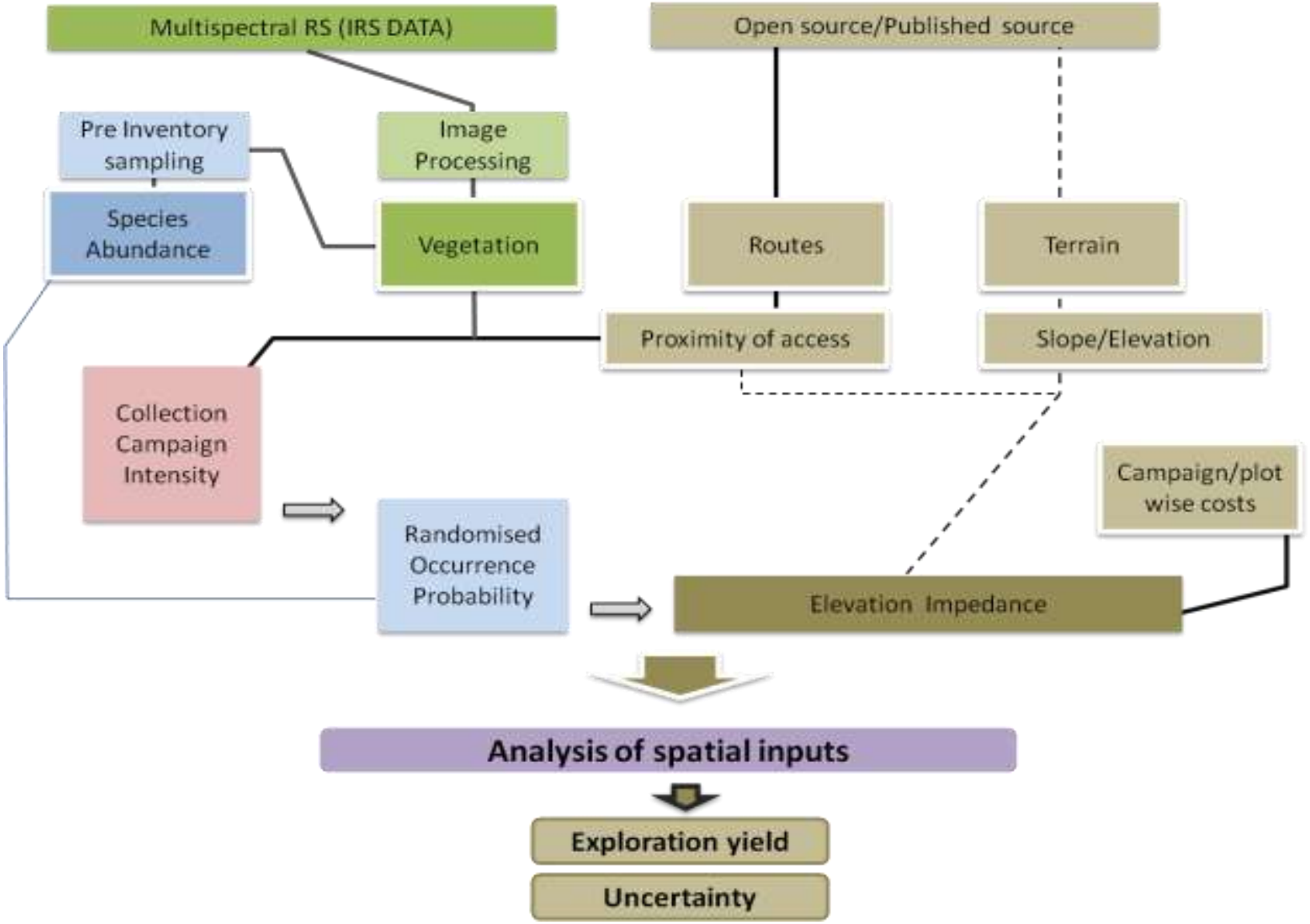
- Ladakh ,rich in potential vegetation ,has good number of medicinal and aromatic plant resources.
- Many of those medicinal plant resources are under explored or unexplored.
- There should be an effective model to help the explorers.
- Remote Sensing helps in understanding spatial objects, the effective logistic analysis.
- GIS helps in Analyzing and manipulating the data .

Software's Used

- ERDAS Imagine 9.3
- ArcGIS Desktop 9.3(Spatial Analyst Tools)
- Excel 2007

Methodology

Data flow diagram

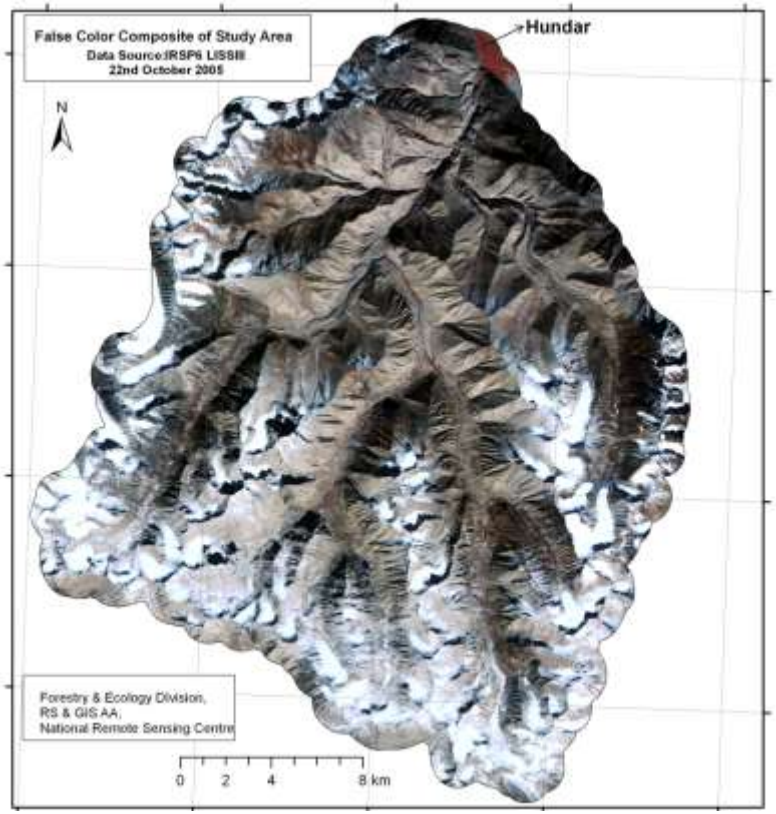


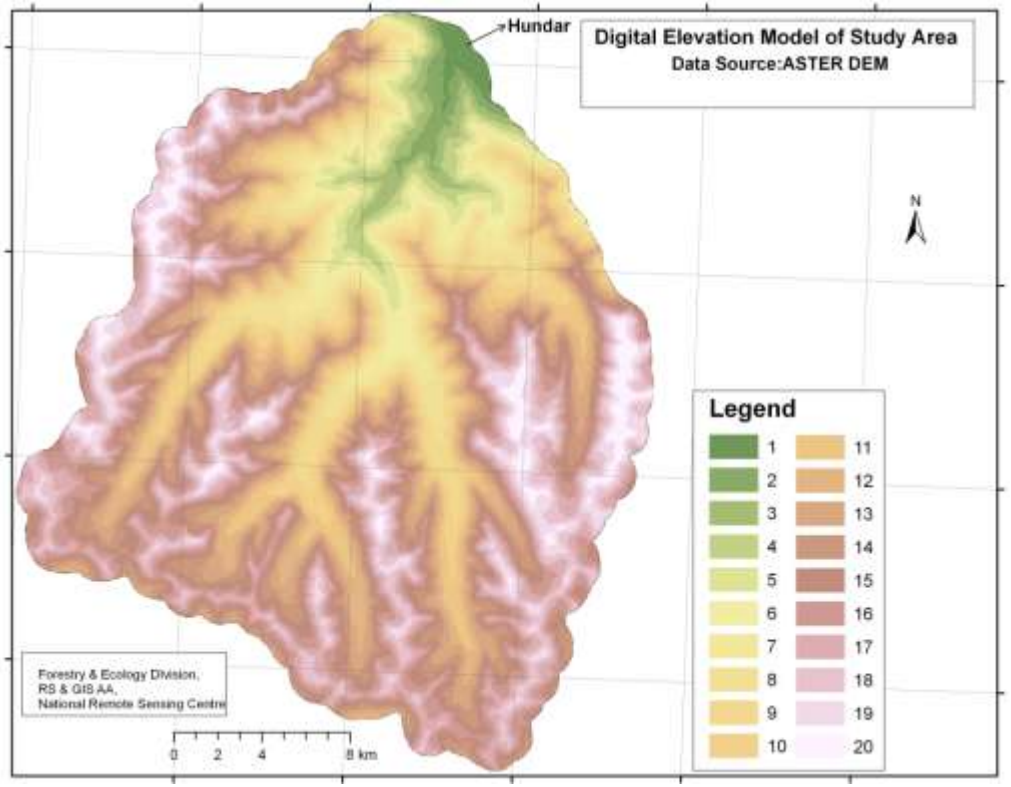
DEM Preparation

- 30 Meter(ASTER) resolution DEM downloaded and reprojected to UTM projection (meters)and clipped it to study area.

- Using Spatial Analyst , calculated slope and aspect raster based on the Dem of the study area.

False Color Composite is used for Generation of Vegetation type map.
Digital Elevation Model is used for slope and aspect raster
(Representing in 20 levels 1-lowest,20-highest)



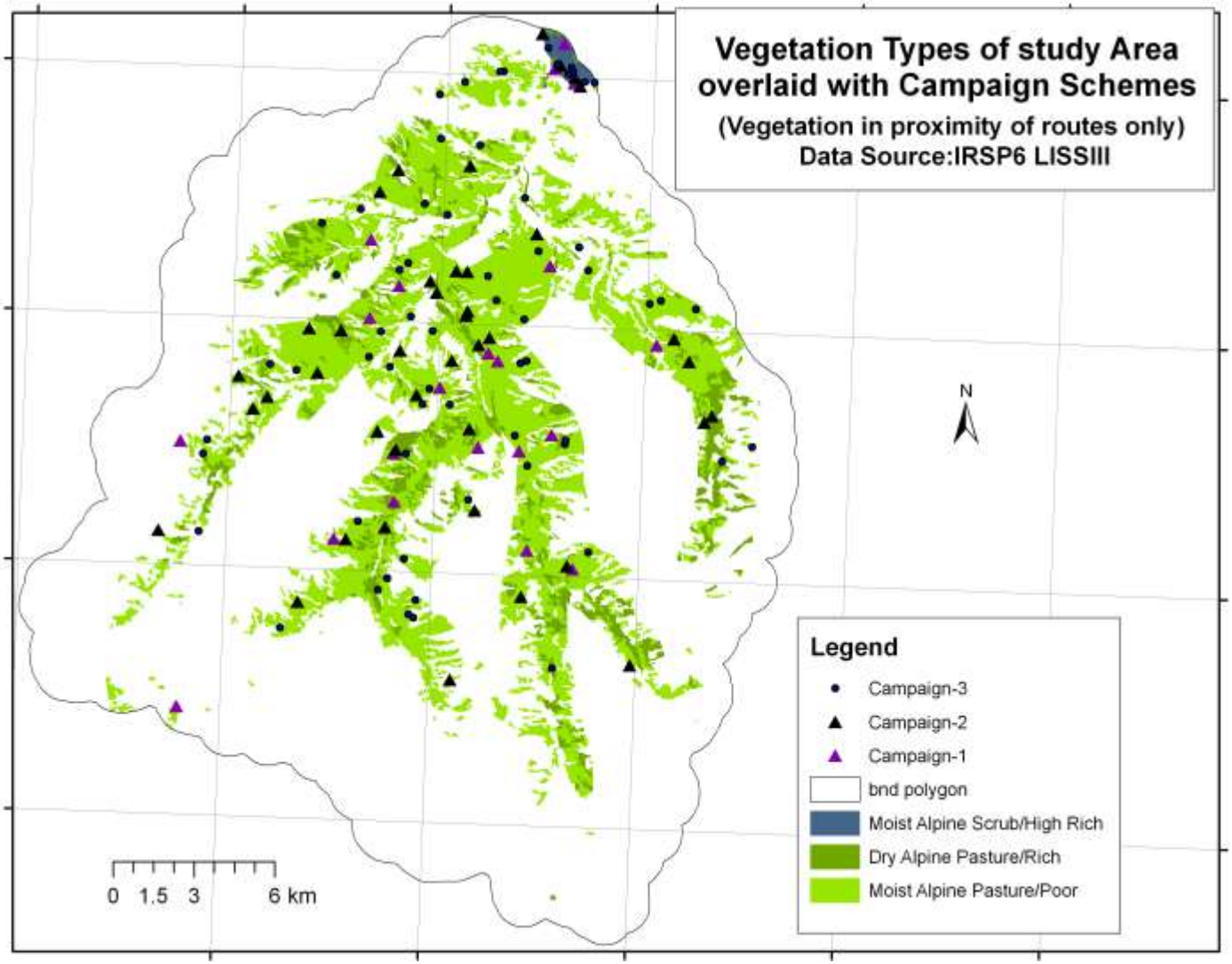


Vegetation type Map Preparation

- IRSP6 LISSIII FCC image(October2005) ,clipped to study area. Snowless model and masked with NDVI for extraction of vegetation.

- Vegetation has been categorized into three categories like High Rich, Rich and Poor based on the important medicinal characteristics of the species which are found.

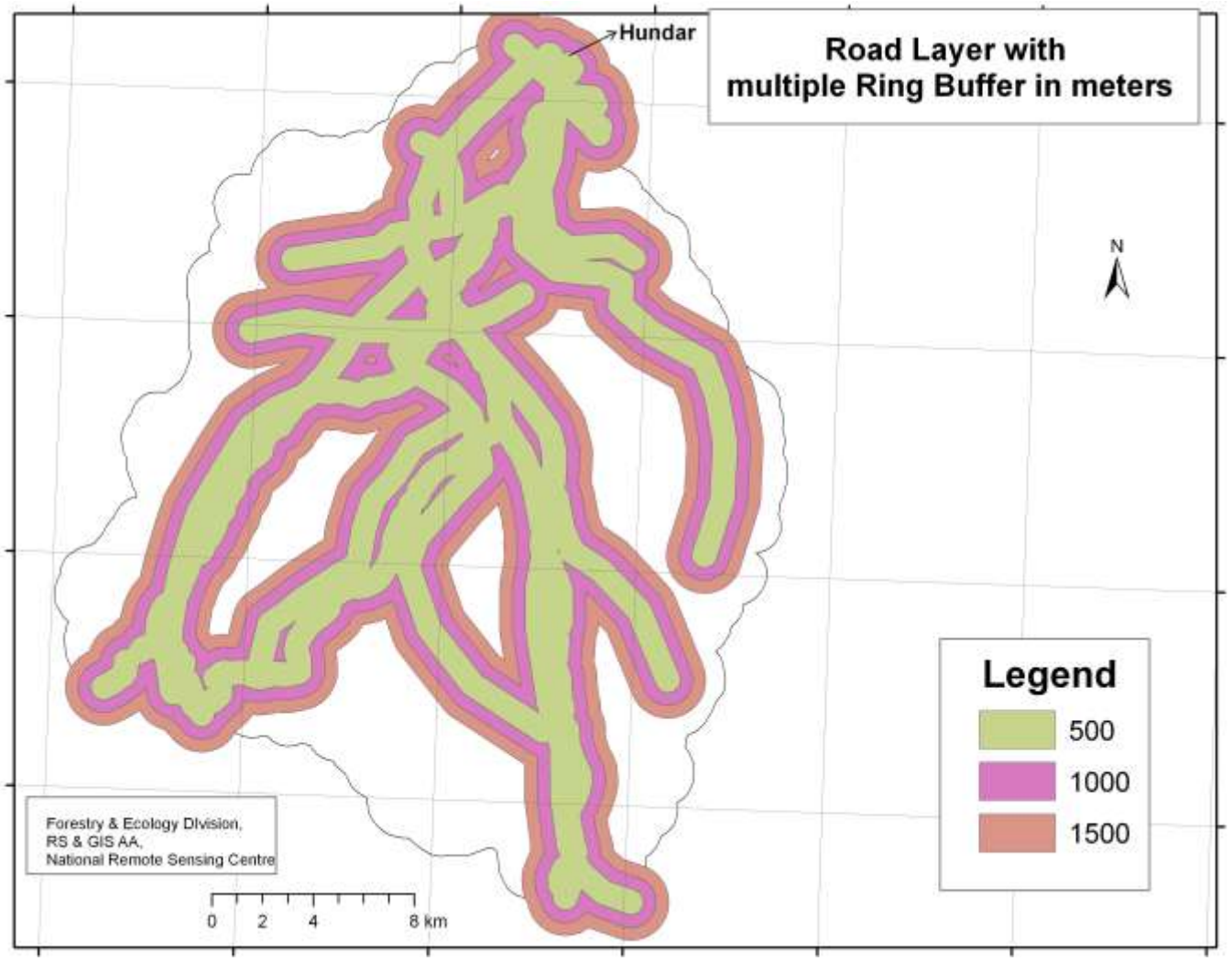
Vegetation Type Map clipped with buffer of roads



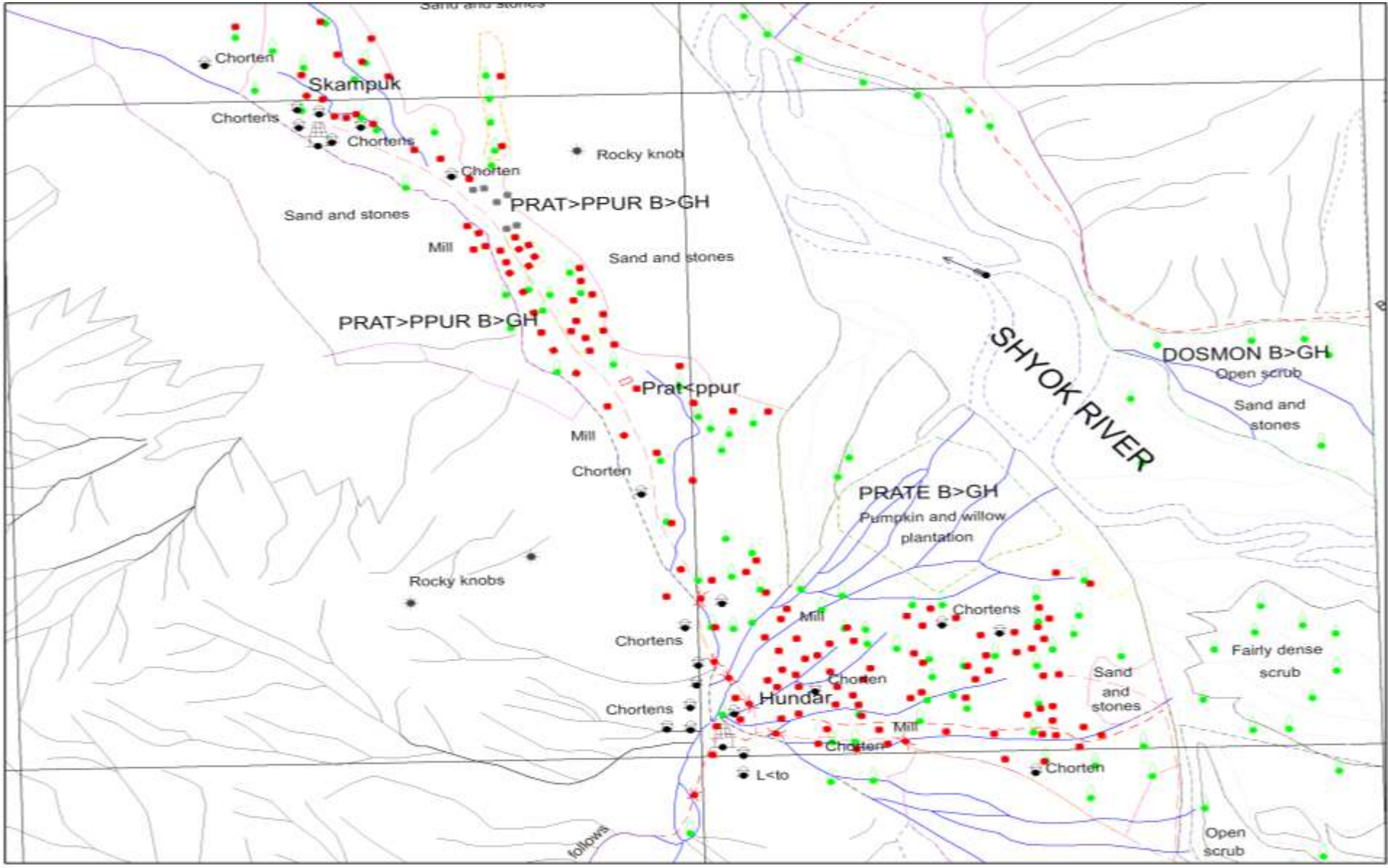
Road Network Analysis.

- Used 1:50000 topographic maps from Survey of India as a dgn format and converted it to shape file.
- Clipped the toposheets to study area and extracted roads and drainage .
- Calculated the shortest path using the cost path analysis.

Road layer extracted from the toposheets and buffered with 500 ,1000 and 1500.



Topographic Maps



Cost uncertainty

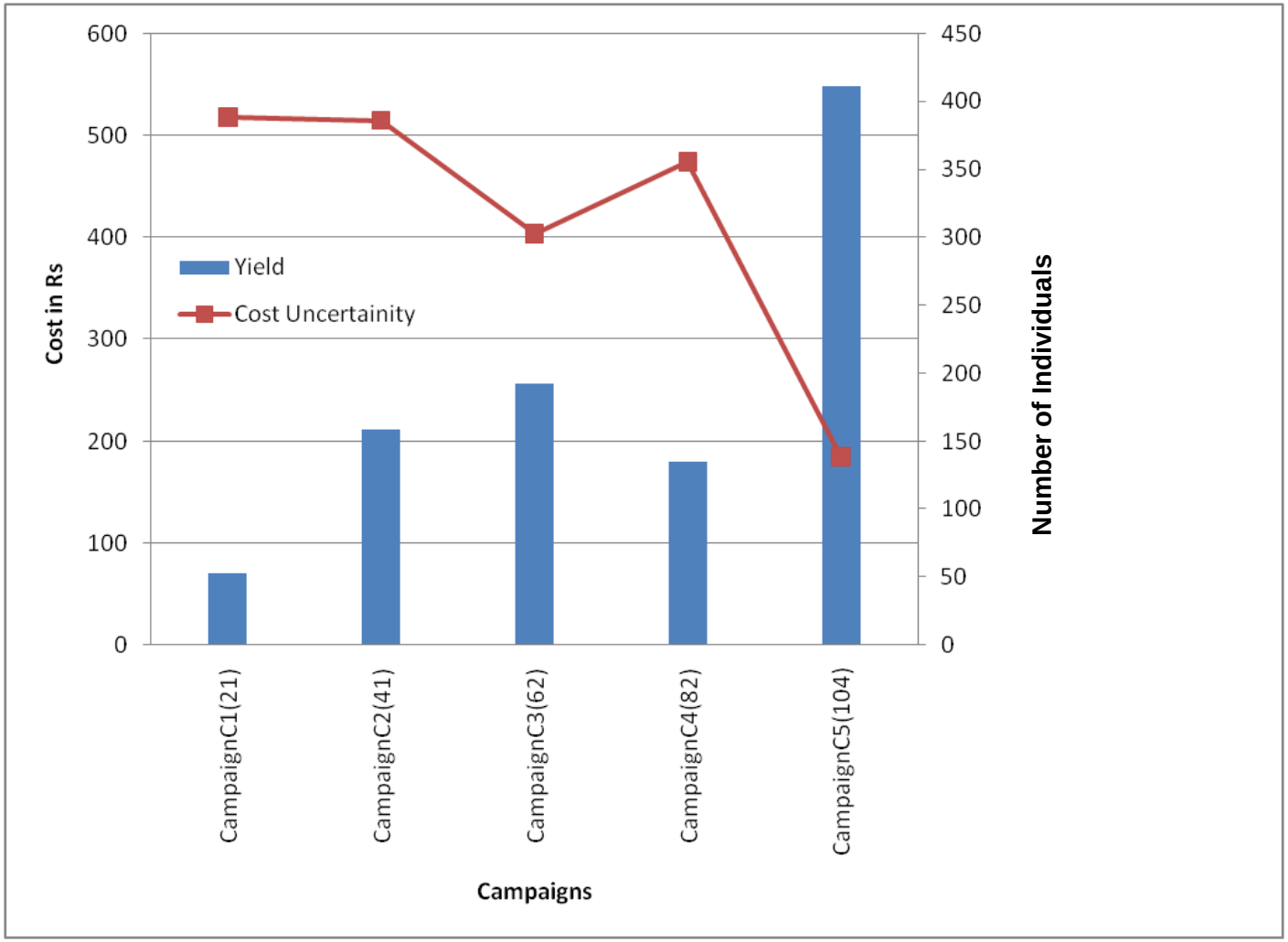
- We face uncertainties every moment in the physical and social environment in which we live .(Statistics and Truth by C.Radha Krishna Rao)

- Uncertainty of the cost calculated using the probability of the rank which is given by normalizing the Distance ,Elevation & Slope.

Results

- Vegetation type map shows the importance of the plant resources .
- The study shows that Campaign C5 is given highest yield out of five campaigns and least cost uncertainty.
- The study proves that increasing number of sample points gave good yield of exploration with the less cost uncertainty.

Estimation of Cost uncertainty and yield exploration



Process of Calculation of Cost uncertainty and yield exploration

Cost Uncertainty Estimation		
Campaign-C1 Plot No	**Rank Probability**	**Cost Variability**
1	0.05	1722.8
2	0.03	997.4
3	0.03	1088.0
4	0.05	1722.8
5	0.05	1813.4
6	0.04	1541.4
7	0.04	1450.7
8	0.03	906.7
9	0.03	906.7
10	0.04	1541.4
11	0.05	1813.4
12	0.06	2176.1
13	0.05	1813.4
14	0.03	1088.0
15	0.04	1541.4
16	0.05	1813.4
17	0.07	2538.8
18	0.05	1632.1
19	0.06	2266.8
20	0.05	1722.8
21	0.08	2901.5
Total		**35000**
	Cost Uncertainity	**518**

	Process of yield Estimation								
	Type1			**Type2**			**Type3**		
Campaign C1	**Species1**	**Species2**	**Species3**	**Species1**	**Species2**	**Species3**	**Species1**	**Species2**	**Species3**
Plot Number	**Her pin**	**Ber uli**	**Ran lae**	**Gen leu**	**Che fic**	**Nep dis**	**Dig ste**	**Poly are**	**Dra alt**
1	**F0.52**	**0.26**	**0.13**	**0.69**	**0.28**	**0.14**	**1.69**	**0.68**	**0.34**
2	**D0.44**	**0.18**	**0.09**	**0.49**	**0.18**	**0.09**	**2.36**	**0.65**	**0.35**
1	1	0	0	3	1	0	6	2	0
2	1	0	0	1	1	0	7	1	0
3	0	0	0	3	1	0	4	1	0
4	1	0	0	1	0	0	2	1	0
5	0	0	0	2	0	0	2	0	0
6	0	0	0	0	0	0	2	1	0
7	0	0	0	2	0	0	2	0	0
8	0	0	0	0	0	0	1	0	0
9	0	0	0	1	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0
11	0	0	0	1	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0
13	0	0	0	1	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0
Total	**3**	**0**	**0**	**15**	**3**	**0**	**26**	**6**	**0**

Conclusion

- The study reported here was a successful validation of GIS application designed to enhance the effectiveness of cost uncertainty in yield exploration.
- Spatial prioritization methods, such as the example presented here, provide a tool to save time and money during collecting trips. The methods are replicable and cost-effective, (given by a computer)needs good GIS software and skills.


Thank you


DOG

Critics

- Both the illustrations are basically same :Both are dogs.
- Which one is ideal and gives optimum results.

Research Optimization

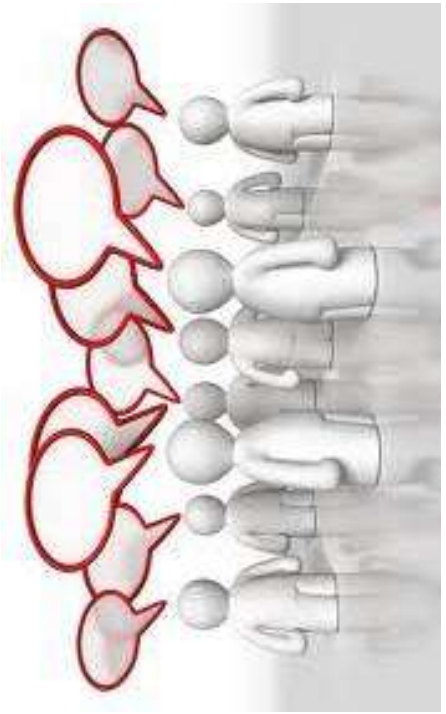
Imagine if you are asked to create/draw a illustration of a dog ?

Optimization

- Does the research need to be robust?
- How much time can be used for development?
- How much time will be used ?(If it is long term or short term?)

Discussion

- Cost uncertainty and yield exploration depended on the different types of parameters like slope, elevation and the distance from the plot to the nearest road/trek.



Sampling Intensities								
Type	Area(sqm)	Area Ha	Percent	0.1	0.2	0.3	0.4	0.5
127	2018398.4	2220	11	2	4	7	9	11
138	29775328	2978	14	3	6	9	12	15
139	155867472	15587	75	16	31	47	62	78
		20785	100	21	42	62	83	104

Row Labels	Sum of AREA
127	149857.8643
138	33524388.51
139	166034351.8
171	1974896.195
180	263258624.4
255	168910610.4
Grand Total	633852729.2