Mapping of Natural Resources and Creation of Database of Natural Resources of Bhaderwah, Doda, Jammu and Kashmir

Mr. Nazim Tariq

B.A, M.A GEOGRAPHY & B. Ed, (Department of Geography), India

ABSTRACT

This Paper has been made in order to examine the potential of natural resources of Bhaderwah. India is a country with diverse of natural resources. It has plenty of water. Neeru Nallha is the main source of water in Bhaderwah it covers nearly about 1.83 square kilometer area. It is also rich in several natural resources. Bhaderwah is the backbone of the timber industry of J & K as it is well developed in forest. It also plays an important role in the economy of Bhaderwah. These gifts of nature are known as natural resources.

Remote sensing and GIS techniques have been used to demarcate the area under various natural resources. Satellite data have been extracted from different sites which are useful in mapping and quantifying the extent of natural resources of Bhaderwah. The slope map of the study area is generated through Digital Elevation Model (DEM). The DEM generate from the digitized topographic contour which can be used through GIS to extract slope morphology.

In this study Geographical information system (GIS) and different satellites images have been used to extract the natural resources area which is useful for future planning. Geographical information system (GIS) helps a lot in monitoring the area of these natural resources as compared to convectional techniques.

Keywords: Natural resources, Remote Sensing, GIS, Bhuvan ,Cartosat, Slopemap, area, production.

I. INRODUCTION

Natural resources includes total natural environment that is the entire surface layer of the earth, because all parts of earth's surface are of some use of man in they contribute to the production of necessities and comforts of mankind. Natural resources are the components of atmosphere, hydrosphere and Lithosphere.

CLASSIFICATION OF NATURAL RESOURCES:

1. Three main types of natural resources can be classified on the basis of their nature:
I. Inorganic resources viz. air, gases, water, metallic ores etc.
II. Organic resources viz. plants, animals including man, micro-organisms, fossil fuels, coal, wood etc.
III. Mixture of inorganic and organic resources viz. soil.

2. On the basis of their utilization natural resources can be classified as:
I. **National i.e.** found in national boundaries e.g. minerals and lands.
II. **Multinational i.e**. utilized by many countries e.g. some rivers, lakes, migratory animals.
III. **International.** Used by all inhabitants of earth.

3. On the basis of abundance and availability
I. **Inexhaustible**. These are present in plenty and cannot be exhausted by man's consumption viz. air, sand, clay, water, solar radiation etc.

although air will never become limiting, its quality can be affected due to continuous increase in human population.

II. **Exhaustible.** Resources are further divided into:
a. **Renewable resources**
b. **Non-renewable resources**

A. **Renewable resources** are those which are being continuously consumed by man but renewed by nature e.g. water, soil fertility, natural vegetation, wildlife, aquatic animals and humans etc. the resources reappear by the quick replacement, recycling and reproduction in a particular time. Some example of ecosystem and their important renewable products are:
1. **Wildlife,** which is responsible for maintenance of food chain
2. **Forests** responsible for providing timber etc.
3. **Rangelands** which sustain grazing animals.
4. **Agricultural system** which provide food etc.
5. **Marine and fresh water systems** which provide various types of food from plants and animals.

B. **Non-renewable resources.** They are not renewable after use and are not replenished by nature e.g. fossil fuels minerals viz. biological species and minerals etc.

Principal natural resources are:
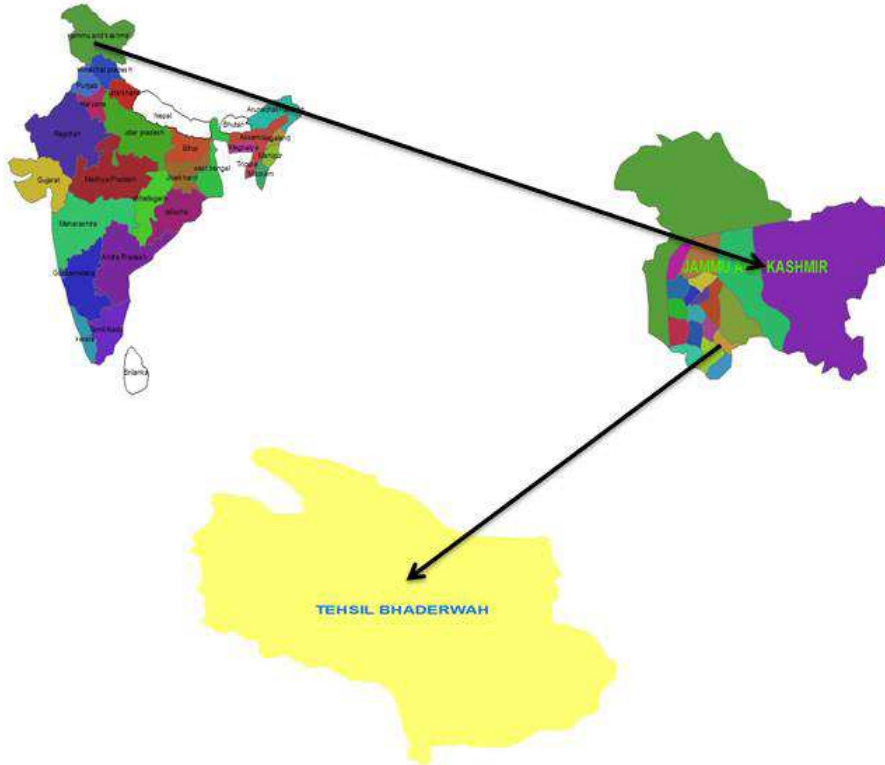I) Soil II) Water III) Land IV) Energy V) Marine and VI) Minerals…. (1)

In simple words we can say that Natural resources refer to those things that exist freely in nature for human as it is God gift. These natural resources are useful for humans and other life forms on the earth.

INTRODUCTION OF THE STUDY AREA

Bhaderwah is a Town in the UT of Jammu and Kashmir. It is Located in the foot hills of the Himalayan Mountain and it is about 30 Km away from District Doda . It is known for its scenic beauty. Due to its topographical and cultural similarities with Kashmir valley it is also know as "Chotta Kashmir" or "Mini Kashmir". It is also know as Nagon ki Bhoomi which means "Land of Snakes''. Bhaderwah is situated at a height of 5422feet A.M.S.L and is located between 75 degree .40' E longitude and 330.4' N latitude.

LOCATION MAP OF BHADERWAH

MAP .I

PHYSIOGRAPHY: Physiography deals with the study of the surface features and landforms of the earth. On the basis of tectonic history, stratigraphy and physiography, India may be divided into the following four physiographic divisions:
1. The elevated Peninsular region
2. The mighty Himalayas and their associated young folded mountains;
3. The Indo-Gangetic-Brahmputra Plains; and
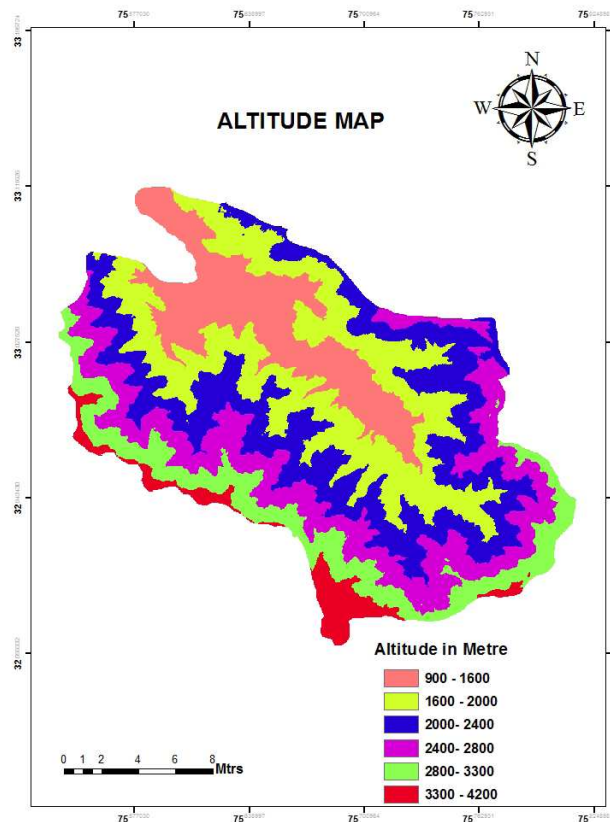4. The Coastal Plains and Islands …………………(2)

The physiography of this valley mainly consists of mountain ranges (Dhars), river valleys, and snow clad peaks. The area falls under middle Himalayan range or "Pir Panjall" range which is about 15500 feet. There are numerous peaks of great height which attracts the mountaineers for climbing in different parts of the valley. Bhaderwah also known as Chotta Kashmir due its climatic and physiographic resemblance with Kashmir it is famous for Kailash Peak which is about 14500 feet in height. According to the Hindu belief, this peak is known for its sacred values. It is a good source of attraction for mountaineers and pilgrims. Other famous peaks of Bhaderwah are "Chatter Galla" which is about 3400 feet and "Padri gali" 10000 feet in height which is situated at the border of Chamba and Gundoh area.

SLOPE:

Slope is an important factor in determining the most suitable areas for floods preading purposes and is one of the key factors in the selection of flood distribution areas. Water velocity is straightly related to direction of slope and its depth. On steep slopes, surface runoff is more erosive which can easily remove loose sediments down slope where infiltration is less and is not applicable to recharge. The slope map of the study area is generated through Digital Elevation Model (DEM). The DEM generate from the digitized topographic contour which can be used through GIS to extract slope morphology.
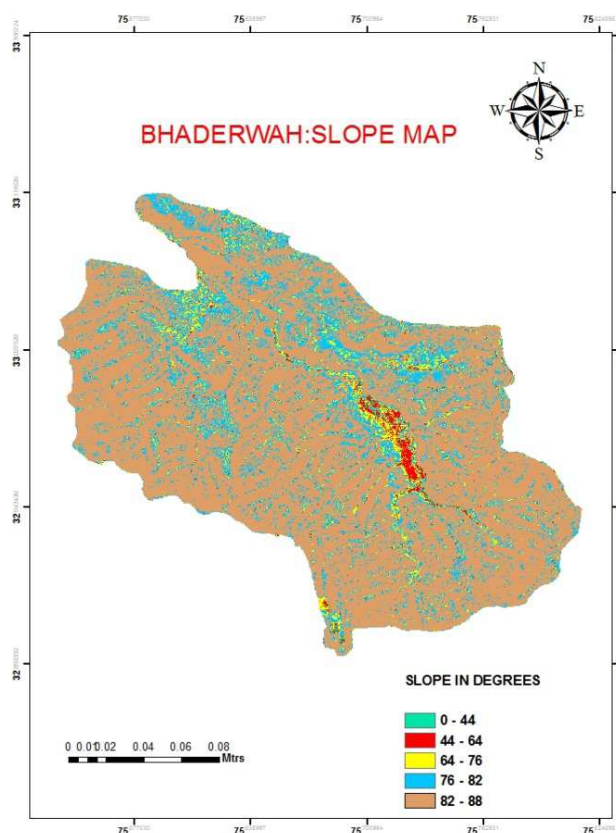
Slope map is a raster map with each pixel denoting the degree of slope. The slope map is then sliced for slope category in percentage and the derived slope map is classified into seven categories such as 0-2% is flat, 2-5% gently sloping, 5-8% undulating, 8-16% rolling, 1630% hilly, 30-45% steep and >45% very steep. Most of the area of Bhaderwah is hilly. Slope of 0 degree to 88 degree lies in the Dhar ranges between the altitudes of 900 to 1600 meters while at the higher altitude between 3300 m to 4200 m slope is greater than 88 degree.

MAP.II
ALTITUDE MAP OF BHADERWAH

Source: Cartoset

MAP. III
SLOPE MAP OF BHADERWAH

Source: - http://bhuvan.nrsc.gov.in/data

➢ **OBJECTIVES**
1. To identify the various natural resources of Bhaderwah.
2. To demarcate the areas under various natural resources.
3. To examine the potential of natural resources of Bhaderwah.

➢ **DATA SOURCE:**
To achieve the objectives, both primary data and secondary data are used for this study.

Primary data:
The primary data in the form of DEM (digital elevation model) data which was extracted from SRTM (Shuttle Radar Topography Mission) downloaded from USGS for Bhaderwah which was used to derive slope and aspect of the area.

Secondary data:
The secondary data in the form of Tehsil map of Bhaderwah which was used to generate the shape file of the city area. Additionally, Secondary data for the study was acquired from reliable internet sources used in delineation of natural resource.

➢ **METHODOLOGY**
Software used:
With regard to this study for data preparation and organization, data analysis and output generation computer hardware and software are used for the study. The hardware includes Personal Computer and Printer. The software is also for preparing and analyzing of data in materials. The software's use for data preprocessing and preparation, data analysis, editing and output generation are:

A. ArcGIS 10.0
ArcGIS 10.0 is used-
1. To geo-reference the Tehsil map of Bhaderwah.
2. To digitize the geo-referenced map and to generate the shape file of the concerned area.
3. To extract the required Tehsil area by superimposing shape-file created on DEM by applying extract by mask tool.
4. To create final layout maps for Physiography map, slope map, drainage map, vegetation map and map of agricultural land.

B. Data Analysis and Presentation:
This include

1. Digitizing
This function of GIS is used to develop features like polygon, polyline and point which are used to represent area, roads, any specific location etc. In this project work polygon feature has been used to digitize the Tehsil map of the Bhaderwah.

2. Physiography map
Physiography map is used to find the altitude of a particular area. The physiography map of Bhaderwah was prepared by using DEM through arc GIS 10.0 software.

3. Slope map
Slope map is used to find the slope of a particular area. This map is prepared by using DEM through arc GIS 10.0 software.

4. Stream ordering
Stream ordering is used to find the order of various stream of a river. This map is prepared by using DEM through arc GIS 10.0 software.

5. Vegetation map
Vegetation map is used to find the areas covered by vegetation such as forest, herbs, shrubs etc. This map is prepared by digitization using polygon feature on base map of arc GIS 10.0 software.

6. Agriculture map
Agricultural map is used to find the area which is under the crops. This map is prepared by using polygon feature on base map of arc GIS 10.0 software.

7. Water resource map
This map is used to find the area covered by river and is prepared by using polygon feature on base map of arc GIS 10.0 software.
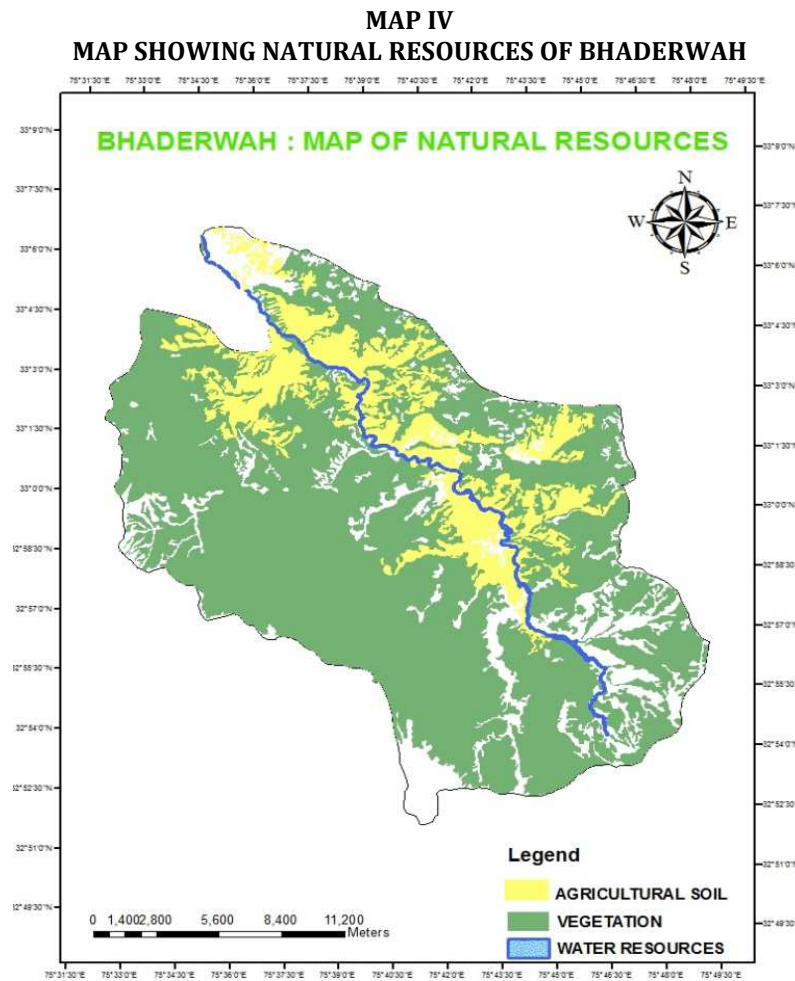
II. RESULT AND DISCUSSION
2.1. NATURAL RESOURCES IN STUDY AREA
In the study area following resources have been studied which include:
➢ **Forest**
➢ **Water**
➢ **Soil**

These resources are shown in the following map and area is shown in the table below:

MAP IV
MAP SHOWING NATURAL RESOURCES OF BHADERWAH

Table no. 2.1 Area under natural resources of Bhaderwah

S.NO	COLOUR	NATURAL RESOURCES	AREA COVERED (Sq.km)
01		AGRICULTURAL SOIL	68.73
02		VEGETATION	356.28
03		WATER	1.83

In this study natural resources which are studied include: water, agricultural land and forest resources. Maximum area of Bhaderwah is covered by vegetation which is about 356.28 Square kilometer. Agriculture soil ranks second in terms of total area which is about 68.73 sq. kilometer while. Water resource ranks third which is about 1.83 square kilometer.

FOREST
Forests play an important role in the economy of our country. They also help in maintaining the ecological balance and checking soil erosion. In order to maintain a steady supply of wood for fuel and timber and other minor products, we should plant more trees than what we fell. We need to take care of forest on scientific lines so that we can improve their quality and extent.
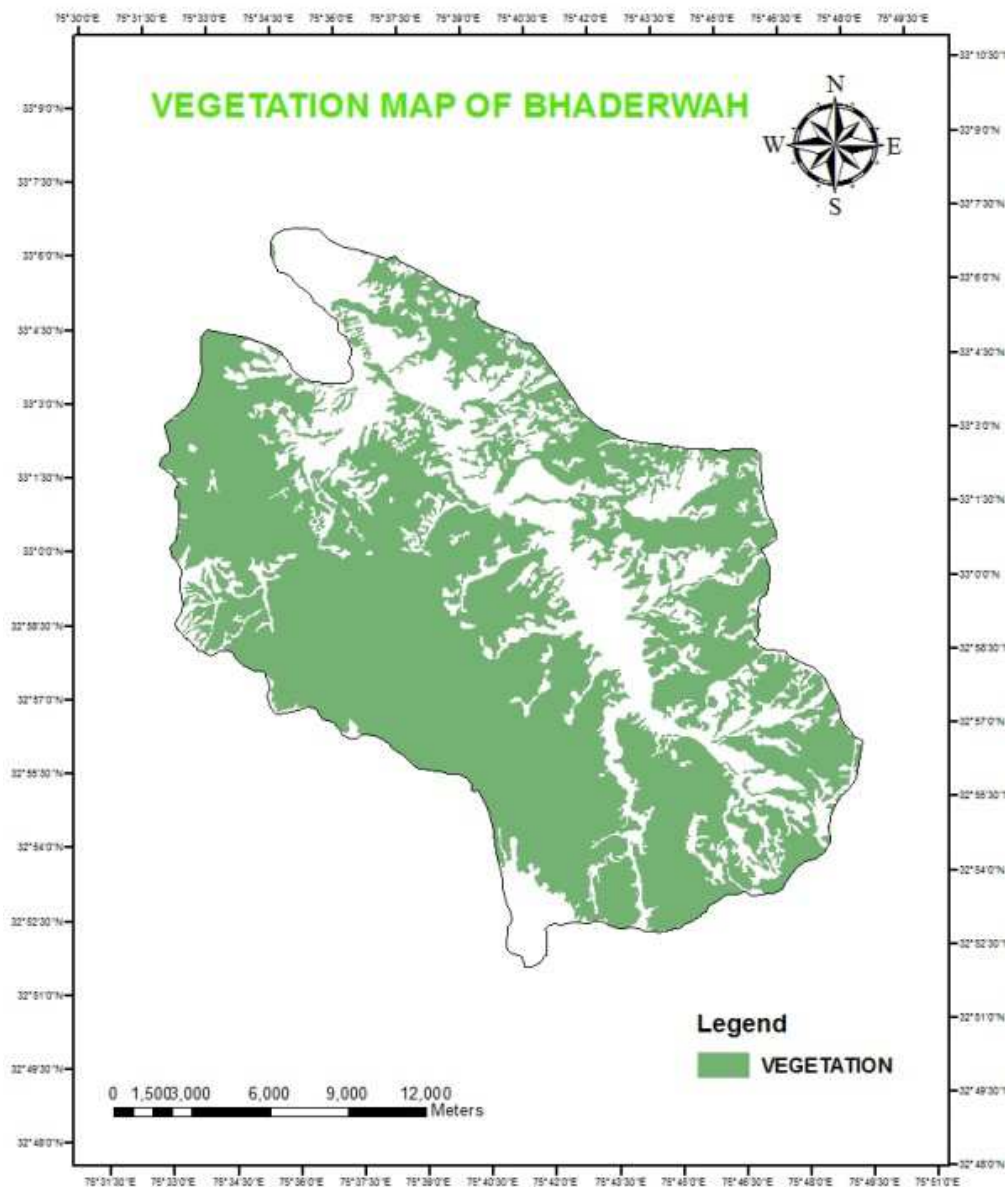
Let us remember that we get the following things from forests:
F: Fuel, fodder, firewood

O: Oxygen

R: Rain

E: Earth

S: Soil and

T: Timber

Let us remember that forests:
A. Check soil erosion
B. Control floods
C. Provide natural habitat for wildlife………(3)

MAP V
VEGETATION MAP OF BHADERWAH

Table no. 2.2 Area under Vegetation of Bhaderwah

S.NO	COLOUR	AREA COVERED (Sq.km)
01		356.

Table 2.2 revels that the total area covered under vegetation in Bhaderwah is 356.28 sq. Km. Maximum area of vegetation is under forest and a very small area is under herbs and shrubs. Most of the forest area of Bhaderwah lies in the hilly and mountainous area. Due to variety of relief and soil different types of forest are found here. The timber industry of J & K also depends upon the forest of Bhaderwah town directly or indirectly.
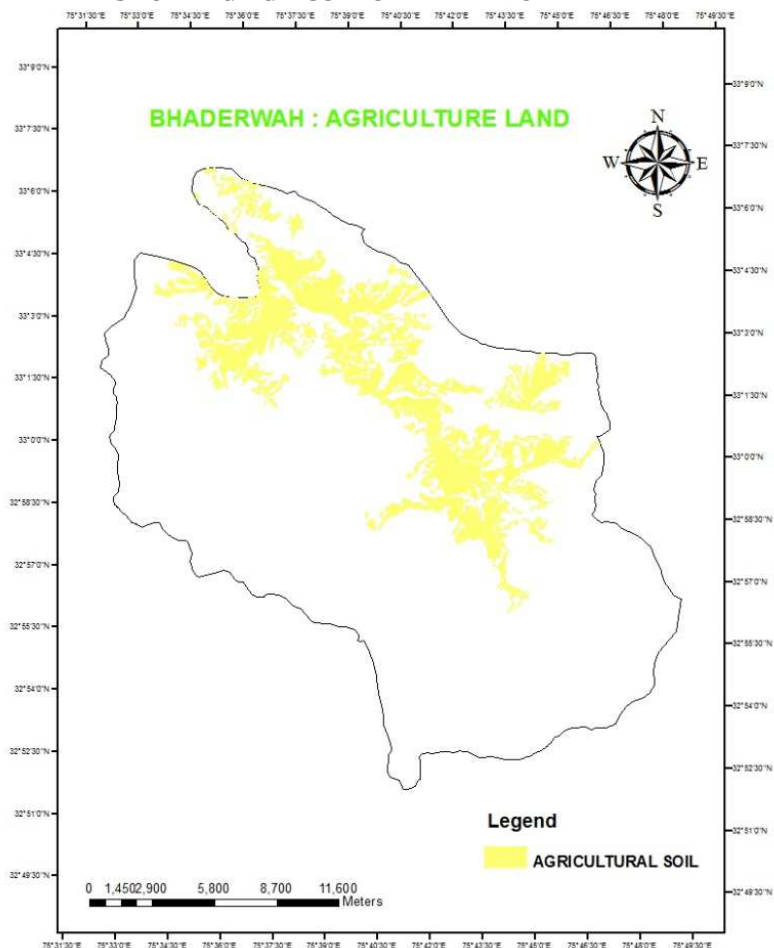
Unfortunately, we the people of Bhaderwah are losing these natural resources day by day. Due to construction of different roads in Bhaderwah i.e. Chamba and Bani Bassoli road we loss different types of forest. Another reason for the loss of forest is increasing population. Firewood is the most important source of energy used for cooking and other purposes, allot of forest are clear for agricultural purpose which will be harmful for next generation. We the people of Valley doesn't know the value of these natural resource, actually we are losing "green diamond".

AGRICULTURAL LAND
Soil is the most important resources because we get almost all our food directly or indirectly from it. Think of cereals-wheat, rice and millets, pulses, oilseeds, beverages, vegetables and fruits, all are obtained from the soil. Other food items such as poultry, meat and milk are animal products. But these animals also feed on products derived from the soil. Besides food, timber, fibres, rubber, herbs and medicinal plants are also obtained from the soil. …….(3)

The main crops growing in the area are maize, wheat, rice, pulses, vegetables and oilseeds. Other than food grains, pulses and oilseeds are on small patches depending upon the terrain of the area………..(4).

MAP VI
MAP SHOWING AGRICULTURAL LAND OF BHADERWAH

Source: Cartoset

Table no. 2.3 Area under Agricultural land of Bhaderwah

S.NO	COLOUR	AREA COVERED (Sq.km)
01		68.73

Table 2.3 reveals that the total agricultural land in Bhaderwah is 68.73 square kilometer. Agriculture is the backbone of Bhaderwah economy. Most of the people live in rural areas which directly depend upon agriculture. Agriculture is the only assist of their livelihood. Maximum agricultural land lies in the plain region of Bhaderwah. The valley comprises high relief, dissected topography, harsh winter climatic conditions, dense forests and steep slopes and in such tough climatic conditions. The natural flat lands are not available for cultivation of crops, except some small patches of agricultural land are also found in the southern slope of the mountains because of the availability of sunshine for the maximum time of the day. The main crops growing in Bhaderwah are rice, wheat, maize, and pulses.In the valley there is a tradition of helping one another in agricultural pursuits especially during sowing and harvesting period of rice, as its need a lot of labour and this activity is locally called as "Badlen".The corn seeds are separated by hands and the rice grains are separated from straw by beating it with long sticks. The place where grains are separated from straw is locally called as "Khall". It means all agricultural work is done manually, from ploughing to the separating of grains which requires a lot of labour and time. Bhaderwah is also called as Rice Bowel of the District because it produces good quality of rice locally known as "Desi Chawal" or "Japani Bhat".

Table 2.4 Production of different Food (Kharif+Rabi) crops (2016-17).
(000 Qtls.)

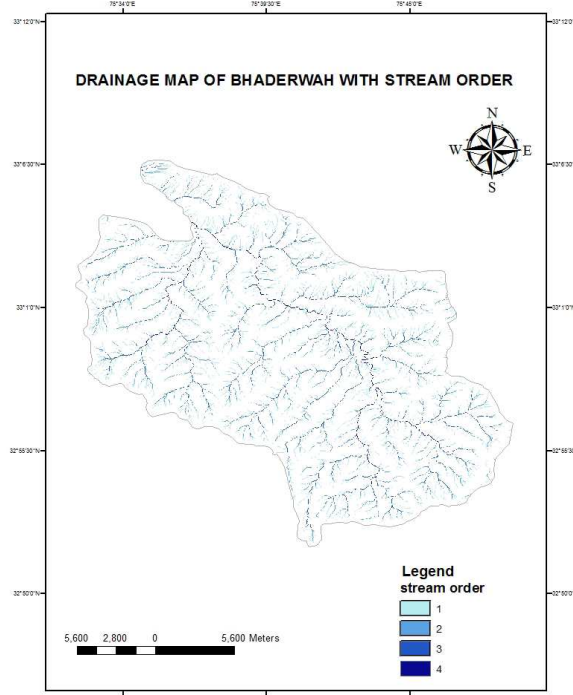| Crops	Paddy	Maize	Wheat	Pulses	Total
Production	11492	52210	12870	1470	78042

Source: Agricultural Department

WATER
Water is one of the most precious natural resources and a key element in the socio/economic development of a country. A person can live without food for a month, but only for a week without water. Nothing will quench thirst the way water can.Water is the essential part of the modern day life .It is used for drinking ,bathing, washing, irrigation, industries and a host of other purposes...........(5)

It is also one of the most important natural resources of Bhaderwah that are potentially useful. Neeru nallah is the main source of the water in Bhaderwah, which flow in the middle of the valley and most of the water is used for agriculture purpose.

MAP VII
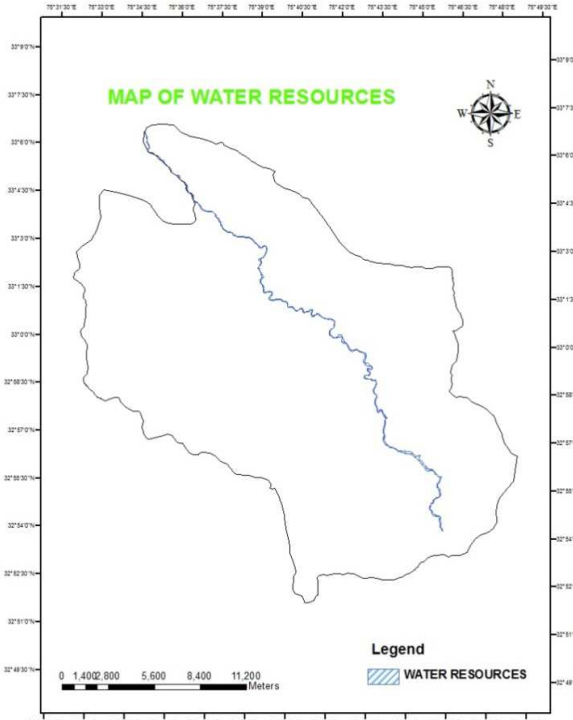**DRAINAGE MAP OF BHADERWAH WITH STREAM ORDER**

Table no. 2.5 Stream ordering of Bhaderwah.

S.NO 01	STREAM ORDER 1	STREAM LENGTH (Km) 8.8
01	1	8.8
02	2	4.4
03	3	3.1
04	4	0.8
Total	...	17.1 Km

Table 2.5 reveals that the total stream length of Bhaderwah is 17.1 kilometer. Total length of stream order decreases with increase in stream order. Maximum stream length is of first order stream which is 8.8kilometer and the minimum stream length is of fourth order stream which is 0.8kilometer.The main source of water in Bhaderwah is Neeru Nallha and its tributaries are Haloon Nallha, Halian Nallha, Chakka Nallha and Chinote Nallha. All these Nallhas have their source from Ashapati and Kailash glaciers. The Neeru Nallha joins river Chenab at Pul Doda.

MAP VIII
Map showing area under water resource in Bhaderwah

Table no. 2.6 Water resource of Bhaderwah

S.NO	COLOUR	NATURAL RESOURCES	LENGTH (km)
01		RIVER	34

Total length of Neeru Nallha is about 34 kilometer. Maximum area under water Resource is contributed by Neeru basin. Width of Neeru is maximum in plain area because lateral erosion is more in plain area than hilly area.

CONCLUSION

From the above discussion we can conclude that natural resources found in Bhaderwah are abundant in nature which includes not only water, agricultural land but also forest resources. Maximum area of Bhaderwah is covered with vegetation which is about 356.28 square kilometer. Agriculture soil ranks second in term of total area which is about 68.73 Square kilometer while. Water resource rank third in term of total area which is about 1.83 square kilometer.In this study Geographical information system (GIS) and different satellites images have been used to extract the natural resources area which is useful for future planning. Geographical information system (GIS) helps a lot in monitoring the area of these natural resources as compared to convectional techniques.

Acknowledgement

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