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RECREATIONAL POTENTIAL OF THE TOURIST ZONE TAKING INTO ACCOUNT NATURAL CONDITIONS (CASE STUDY: R. GANGA - RISHIKESH)

РЕКРЕАЦИОННЫЙ ПОТЕНЦИАЛ ТУРИСТИЧЕСКОЙ ЗОНЫ С УЧЕТОМ ПРИРОДНЫХ УСЛОВИЙ (НА ПРИМЕРЕ: р. ГАНГА - РИШИКЕШ)

Ганга - Ришикеш аймагындагы дарыянын жээк зонасынын мисалында туристтик зоналардын рекреациялык потенциалына таасир этүүчү факторлор изилденген. Негизги көрсөткүчтөр катары: физикалык жана экологиялык, социалдык-демографиялык, саясий жана экономикалык каралган.

Иш Индиянын Дехрадундагы аралыктан зондирлөө институтунда илимий стажировкалардын негизинде жүргүзүлгөн. Рекреациялык потенциалды комплекстүү изилдөө үчүн, талаа жана лабораторлук иштери аралыктан зондирлоөө ыкмаларын колдонуу менен жүргүзүлгөн.

Туристтик зоналарды пландаштыруунун өзгөчөлүктөрү каралат. Эс алуу зоналарын рекреациялык пландаштыруу чөйрөсүндө болгон илимий иштер изилденген. Ришикеш туристтик зонасынын мүмкүнчүлүктөрү эсептелген.

__Өзөк сөздөр:__ аймактык жана рекреациялык система, туристтик аймак, рекреациялык пландаштыруу, рекреациялык потенциал, туристтердин тыгыздыгы, араыктан зондирлөө, рекреациялык ресурстар.

Изучены факторы, воздействующие на рекреационный потенциал туристических зон на примере прибрежной зоны р. Ганга – в районе Ришикеш. За основу приняты основные показатели: физические и экологические, социально-демографические, политико-экономические.

Работа проведена на основе научных стажировок в Индийском институте дистанционного зондирования г. Дехрадун. Для комплексного изучения рекреационного потенциала были проведены полевые и камеральные работы с использованием методов дистанционного зондирования.

Рассмотрены особенности планирования туристических зон. Изучены существующие научные работы в области рекреационного планирования зон отдыха. Рассчитаны возможности туристической зоны Ришикеш.

__Ключевые слова:__ территориально-рекреационная система, туристические зона, рекреационного планирование, рекреационный потенциал, плотность отдыхающих, дистанционное зондирование, рекреационные ресурсы.
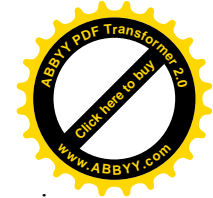
Have been studied the factors affecting the recreational potential of tourist zones. As main basics, indicators have been use: physical and environmental, socio-demographic, political and economic.

The work was finished on the scientific internships at the Indian Institute of Remote Sensing in Dehradun. For a comprehensive study of the recreational potential, field and laboratory work by using remote sensing methods.

Considered are the features of planning tourist zones. Has been studied existing scientific work in the field of recreational planning of recreation areas. Calculated the possibilities of the tourist zone Rishikesh.

Key words: *Territorial and Recreational System, Tourist Zone, Recreational planning, Recreational potential, Density of Tourists, Remote Sensing, Recreational resources.*

Introduction. Most of the Recreational areas planned without regard to the Basic Conditions of the Real Environment. This phenomenon reflects the degradation of organisms observed in the assembly areas.

In the case of Geographic Science, most people who visit the Enhanced Environmental Areas will not be detrimental to the physical, economic and socio-cultural environment of the Permanent Environment used, nor does it reduce the quality taken under recreational activities. The problem arises from the various methods for determining this degree.

We have analyzed a variety of scientific developments in the field of assessment in Territorial and recreational (TRS) systems in the local and international literature, related to three major indicators [3, 4] :

• **Physical and environmental indicators** based on important components (ecological capacity, input parameters), including components such as structures, including water supply, electricity, transport, what else.

• **Socio-demographic indicators** show the impact of tourism on the development of the social level of the local population. Some symptoms expressed in quantitative terms, but most require specialized research.

• **Political and economic indicators** are seen in the impact of tourism on local economic structures (e.g., [8] in terms of income, annual income), etc., e.g. more to compete with other agencies [1, 3, 4].

The data were collected during of a practice at the Indian Institute of Remote Sensing and GIS in Dehradun, which included the reception of remote sensing methods, the collection and processing of field research data, and a sociological survey of tourists staying in Rishikesh.

Materials and research methods. The problem lies in the collection of data on the flow of tourists, since [8] this territory covers three different territorial administrative areas - Dehradun, Rishikesh and Pouri *[8]*. To determine the recreational potential were used statistical data of recreational facilities, stock materials of tourist facilities, LandSat-7 satellite images, and ArcGIS 10.3 software *[8]*.

Research Results.

Step I. Calculation of Existing Loads [8]

We use the following calculations [8]:

a) Local population density (βRP): This data obtained by dividing the local population present in the study area [8] by its area in hectares (ha) [8].

$$b) \ RP = 98825/3314 = 29.82045866 \ (1) \ [8]$$

b) Domestic Tourist Density (βDT): This data obtained as follows [8]:

Step 1. Number of Domestic Tourist Arrivals (TD): The number domestic content during the peak season (days) determines [8].

TD = 5821.0459 (2) [8]

Step 2. Domestic tourist stay during peak season (TDSP): Domestic tourist arrivals defined by multiply the average tourist staying days in that tourist city [8].

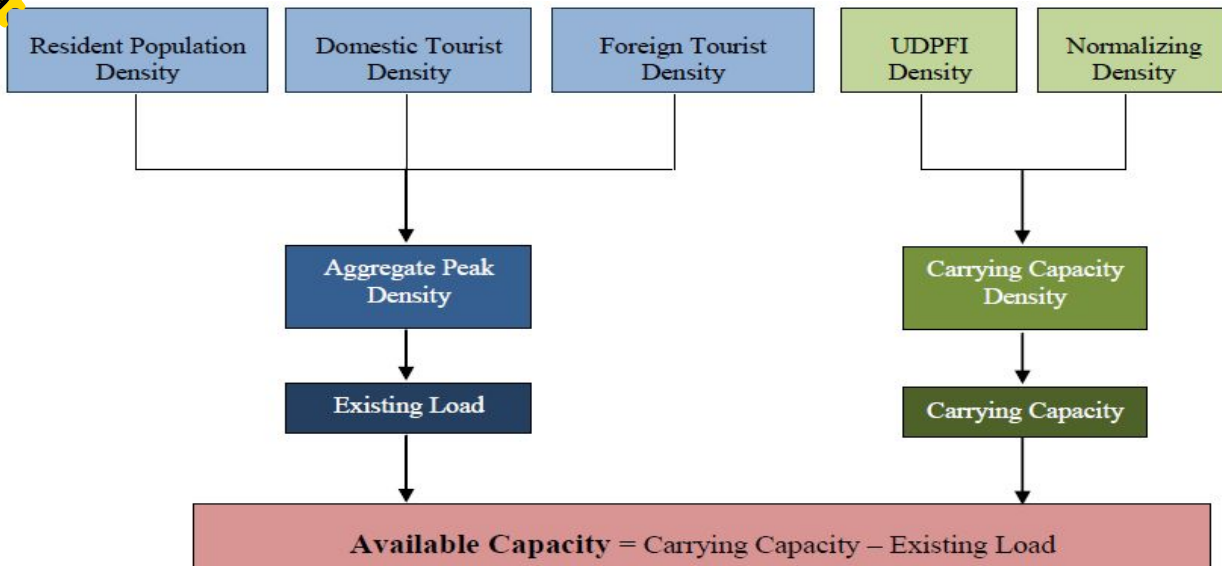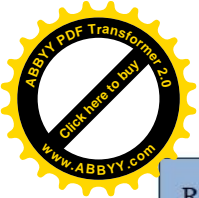**TDSP = TD*Average total day stay=5821.0459*6.6 = 38418.9 (3) [8]**

Figure 1. Methodology for the analysis of recreational capacity [8]

b) Domestic Tourist Density (βDT): obtained as follows: [8]

Step 1. Number of Domestic Tourists Arrivals of (TD): the number of domestic tourists is determined during the peak season (days) was determined [8].

TD = 5821.0459 (4) [8]

Step 2. Domestic tourists staying during the high season (TDSP) [8]: Domestic tourist arrivals determined by multiplying the average tourist staying days in that tourist city.

TDSP = TD * Average number of days of stay = 5821.0459 * 6.6 = 38418.9 (5) [8]

Step 3. Average number of stays per night during peak season (αDSP). [8]

αDSP = average stay number of days / days during peak season = 4 / 6.6 = 0.60606061 (6) [8]

Table 1.
The flow of tourists arriving in the region (2015) [8]

| №	Number of domestic tourists	Number of foreign tourists	Amount
1	46010	1749	47759
2	52909.8	1790.9	54700.7
3	48471	1540.8	50011.8
4	123643.8	2539.8	126183.6
5	155008.2	2208.7	157216.9
6	174659	1643.3	176302.3
7	175572	1833.1	177405.1
8	165132	3245.4	168377.4
9	179511.8	4490.6	184002.4
10	140972.8	5795.4	146768.2
11	106639.4	3937.3	110576.7
12	118586.6	4371.4	122958

Source: Dehradun, Rishikesh and Pouri Travel Agency.

Step 4. Domestic Tourist Density (βDT): estimated dividing the Average Tourist Stays per Day during the Peak Season by Tourist Campus Area in ha.

βDT = αPS / square = 5821.0459 / 3314 = 11.59291 (7) [8]

c) Foreign tourists Density (βFT): It is obtaining as follows:

Step 1. Arrival of a foreign tourist (TF): the number of foreign tourists during the peak season (days) has been determined
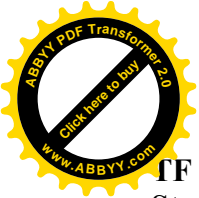
TF = 168.6229508 [8]

Step 2. Peak Season Tourist Stay (TFSP): Foreign Tourists Arrivals [8] multiplied by the average number of days of tourists in the tourist city.

TFSP = TF * Stay Average days= 168.6229508 * 6.6 = 1112.911 (9) [8]

Step 3. Average number of visitor stays per day during peak season (αFSP): calculated by dividing the number of tourists who stay per day during the season in question by the number of days in high season.

αFSP = average stay by number of days / peak season days

αFSP = 4 / 6.6 = 0.60606061 (10) [8]

Step 4. Density of foreign tourists: estimated based on the average number of tourists that arrive per day during the high season to the area of a tourist city in hectares [8].

BFT = αPS / Region = 1112.911 / 3314 = 0.335821 (11) [8]

Total Peak Density (APD) = Population density + Domestic Tourist Density + Foreign Tourist Density

APD = βRP + βDT + βFT = 29.82045866 + 11.59291 + 0.335821 =
= 41.7491896 (12) [8]

Existing Loads = Total Peak Density * City Area
= APD * area = 41.7491896 * 3314 = 138356.814 (13) [8]

II. Carrying Capacity Classification (CC) UDPFI Density (DUDPFI): The Urban Development Plan guidelines and Implementation Guide (UDPFI, 1996) classify cities according to population size, as shown in Table 1. [8]

Table 1.

Specific density [8]

| Town	Population	Upper Density Limit
Small city	< 50 000	125
Middle town	50 000 – 500 000	150
Big city	> 500 000	150
City with meter	> 500 000	175
Small town in the highlands	20 000	75
Medium city in the highlands	20 000 – 80 000	90
Big city in the highlands	> 80 000	90

High ecological distinct from high density - these are places of pilgrimage. Therefore, the target density must be adjusted for these factors, for which a normalization density (№) [8].

The territory under study belongs to the large cities with mountainous terrain.

The definition of normalization density (№) calculated as follows [8]:

A) The parts evaluated with a normalization index (Ni) in the range of -10 to +10.

In areas with a conservative scale density, negative indicators (environmentally sensitive places) and in areas with a density dominated by attractions, architectural works: such as pilgrimages to cities, etc., adopted positive indicators [8].

-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10

Decreasing Density ← → **Increasing Density**
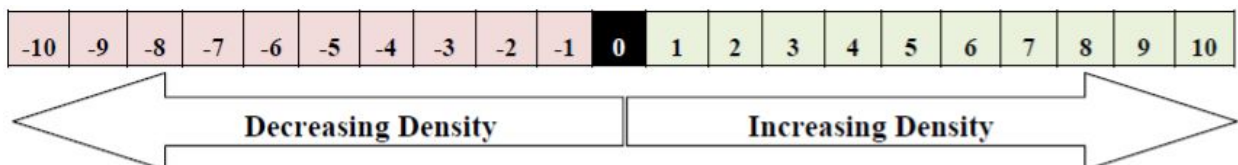
Figure 2. Density normalization indicator (№) [8].

The values of the indices estimated based on a qualitative evaluation in relation to physical and environmental indicators.

Table 3. Assessment Criterion of physical and environmental performance [8]
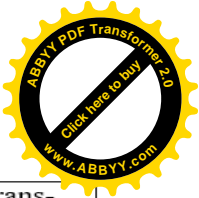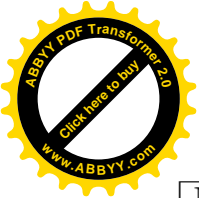
Biodiversity	Noise	Water resources	Waste management	Cultural heritage	Tourism infrastructure	Territory suitability	Transport quality
1	1	2	1	1	1	1	1

The total average indicator of physical and environmental indicators was 1,125.

The density normalization (N) is calculated by multiplying the normalization index by a factor of 10 people / ha.

Normalization density (N) = 10 * Ni = 1.125 * 10 = 11.25 (13) [8]

The value of 10 people / ha was determined by establishing the boundary conditions of the lower and upper stable densities for several tourist cities of the corresponding categories.

The yield density (CCD) calculated by adding the upper limit of the UDPFI density corresponding to the reference density.

Density Yield (CCD) =
DUDPFI + № = 30 + 11.25 = 41.25 (14) [8]

Caring capacity (CC) calculated by multiplying the capacity cargo capacity with the corresponding city area in hectares.

Caring Capacity (CC) = CCD * City Area
= 41.25 * 3314 = 136702.5 (15) [8]

Finally, the estimated existing capacity by finding the difference between the recreational capacity and the existing load during the city's peak period.

Caring Capacity = Capacity (CC) -Existing load = 136702.5 - 138356.814 = -1654.3144 (16) [8]
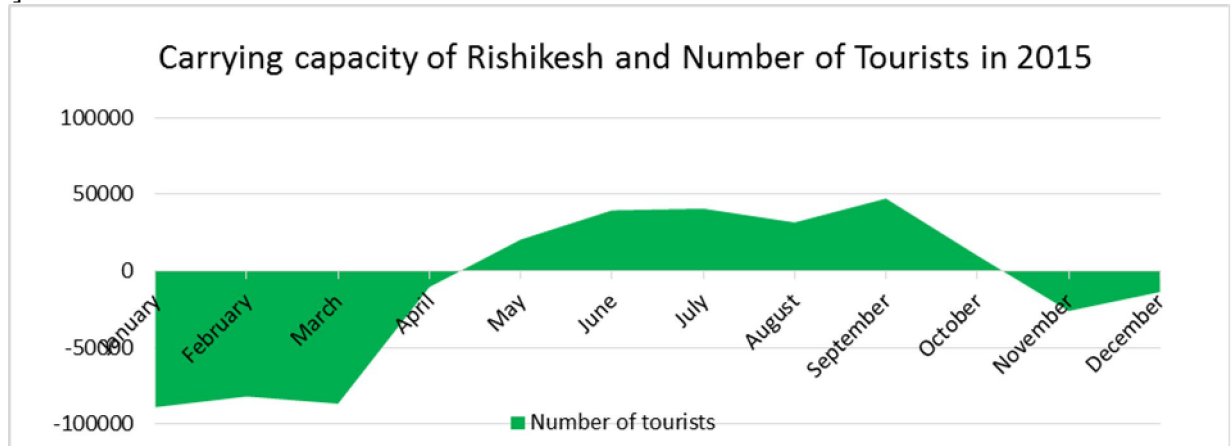

Fig. 3. The ratio of traffic capacity to the number of tourists [8].

Based on analyzes carried out, there is a shortage of reception sites in the territory considered from March to October, as shown above (Fig. 3). The given methodology allowed to identify the peak periods for the considered territory and allows regulating the recreational activities during the period of active stay of the tourists [8].

Most of those who stay during this period are domestic tourists, but there are many foreign tourists who want to visit this area, as this territory is the center for the development of yoga throughout the country, as well as a place to get acquainted with the traditions of these people, who are currently very interesting for foreign tourists [8].

In general, the above methodology showed the compliance of the above calculations with the data on the static indicators of local travel agencies, which gives a conclusion: the accepted calculation methods for determining the performance can be use as one of the ways to determine the flow of tourists and the recreational capacity of local tourist sites and [8] ways of regulating tourist and recreational activities.

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