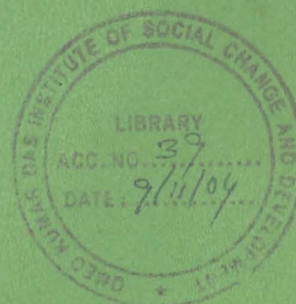


A
STUDY ON THE SCAVENGER BIRDS AND
THEIR ROLE IN THE PUBLIC HEALTH
IN
GREATER GUWAHATI

A SHORT TERM REASEARCH PROJECT REPORT PREAPARED
FOR

OMEQ KUMAR DAS INSTITUTE OF SOCIAL CHANGE AND DEVELOPMENT
NONZAN ROAD, UZANBAZAR
GUWAHATI - 781001

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KALINDRA BALLAV DEVCHOUDHURY. M.Sc.
P. C. GOSWAMI SCHOLAR
1994 - 1995

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Scholarship of

Omeo Kumar Das

Institute of Social Change and Development

Nowzan Road, Uzan Bazar
Guwahati - 781001
Assam

Supervisor

K. B. Devchoudhury

Prof.P.C.Bhattacharjee.M.Sc.,Ph.D.
Animal Ecology and wild life
Laboratory.,
Department of Zoology,
Gauhati University, Assam : India.

P.C. Goswami Scholar

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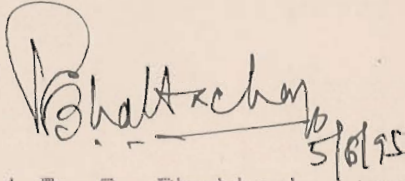
Special thanks will go to Prof. M.Taher for his advice to do in this line.

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Kalindra Ballav Devchoudhury
5.8.95
Kalindra Ballav Devchoudhury

Prof. P. C. Bhattacharjee
Animal Ecology & Wildlife Biology
Department of Zoology
Gauhati University
Guwahati - 781 014
Assam.
Ph : (0361) 570647 (Res), 570294(Off)

This is to certify that Sri Kalindra Ballav Devchoudhury has carried out the short term project " A study on the Scavenger Birds and Their Role in the Public Health in Greater Guwahati" of Omeo Kumar Das Institute of Social Change and Development under my supervision and Guidance.


(P. C. Bhattacharjee)

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1. Introduction

1.1. General Introduction

In the underdeveloped and developing countries the public health is one of the key concern which consumes a major chunk of state exchequer, year after year. The contamination of disease may be waterborne or otherwise is a recurring phenomenon [Sharma 1992]. The interesting Part of the public health is that majority of the diseases can be prevented to a large extent, provided the basic source, season and the potential prevents could rightly be identified [Ghose, 1969].

(The rapid urbanization and increase in human settlement and influse of the floating population in Guwahati there was a quantum jump in Garbage generation. Garbage being a multidimensional and multi source waste product is extremely difficult to tackle in the developing Countries in ecological and environmental term) [Grisham 1986]. The organic source of Garbage is the potential vista for the generation multiple of known as well undetected diseases of Public health interest [Tobanoglouch, Park].

As per the life style of the people of Guwahati and the ethnic variability the Pattern of garbage generation and garbage disposal are noteworthy. The lack of Proper health education, awareness regarding health is almost negligible or has not reached the target population sufficient enough to show a tangible result in improvement in public health.

The scavenger birds play a great role in prevention of the disease particularly by consuming the discarded organic waste mainly of animal origin [Pumeroy, 1973].

The scavenger birds is the major group which takes care of public health to a large extent by consuming animal waste/ other organic waste in the scattered and localised garbage centres. The study of the scavenger birds from ecological point of view is directly related with the public health and some of the disease spreading from the garbage centres. [Ali].

1.2 Rationale of the work

The public health issue is a multi-dimensional one. It originates from various Points but culminates into the gradual degradation of the few of the essential environmental components which facilitate the out break of diseases inflicting health hazards mainly to the vulnerable section of the society, the poor and under previlized and broadly unaware of the sequence of the environmental degradations and its relationship to health.

It become imparative to establish the specific relationships of the natural Protection mechanism and advices of the various diseases of Public health importance. The scavenger birds though very common in such situation but do not have enough of the conjunctual informations with regards to the controlling of the diseases.

1.3. Aim of the Project

Under the back ground of the lack of Proper garbage disposal mechanism, high incidence and recurrence of Public health diseases the project was taken up with a specific aim of -

- (1) Quality of garbage generation in and around Guwahati.
- (2) The type and Population structure of the scavenger birds involve in the scavenging on the garbage centre in and around Guwahati.
- (3) Estimation of food intake by the scavenger in garbage centres.
- (4) The quantification and ecological role the scavenger birds are playing in controlling the disease related to public health.

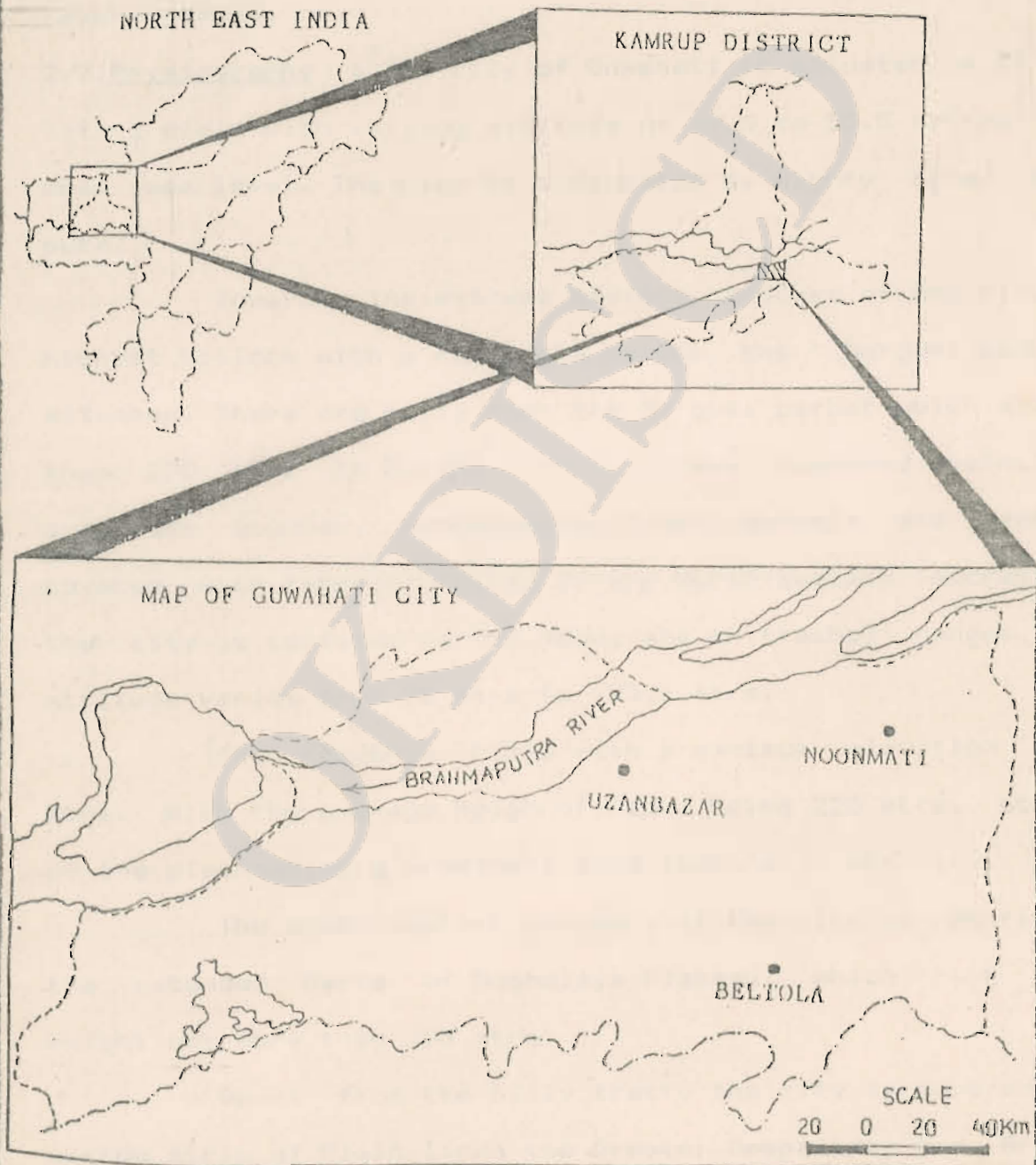
The project is basically aimed at to generate base line data and information related to scavenger birds, type and pattern of scavenging and the consequent impact on public health.

× Hope this will help in the continuation of the scientific studies related to public health and kind indepth go for a study.)

2. Materials and Methods

2.1. Location of the Study Area: Guwahati is the capital city of Assam, located in the south-eastern part of Kamrup district. It lies on the south bank of the river Brahmaputra at an altitude of 55 metres above the mean sea level, the latitude and

LOCATION OF STUDY AREA



MAP

longtitude being 26.10'45'' (N) and 92.49'(E) respectively [Boeh, 1984].

2.2. Physiography : The city of Guwahati is situated on an undulating plain with varying altitude of 49.5 to 55.5 metres above mean sea level. The city is bifircated by mighty river Brahma-putr.

Towards the extreme eastern boundary of the city, the highest hillock with a 420.3 mts height, the " Burgosi parbat" is situated. There are hills near the Burgosi parbat which are more than 270 mtrs in height. The hills are composed mainly of guesisses Granitic, Hornbleande, Biotic genesis and Pegmetite, covered with lateritic soil. On the North-eastern extremity of the city is confined by the Navagraha chitrachal ranges, where attitude varies from 75 mtrs to 123.6 mtrs.

The Kamakhya hills with a maximum elevation of 303 mtrs. With the average heigh of Peaks being 225 mtrs, standsout of the plainmaking a prominent land feature in the city.)

The south-eastern boundary of the city is restriced by the extended Parts of Meghalaya Plateau, which have maximum height not more than 300 mtrs.

(Apart from the hilly tracts the city is covered by a narrow strip of Plain links the Greater Deeparbeel and Brahmaputra river. It is also filled up with scattered swamps, marshes and low lying damp places.)

2.3.Climate: The climate of an area considerably effects human activities and in turn city life and its functioning. Although the climate of Guwahati is almost similar to that of the rest of the Brahmaputra valley, yet some variations are notices due to the physical feature. Its principal characteristics are slighly cold and foggy winter, a moderately cool spring and a fairly hot and humid summer.

Climatically the whole year can be divided into three periods. From February to May, the weather is dry and moistureless and heat is not oppressive. In the month of March, the northeast wind carries the dry sand from the river and makes the shole atmoshere dusty. In April and, May local rain along with thunderstorm are a common feature. The mean maximum and minimum temperature varies from 31° c to 12° c during this period.

From June to October there is sufficient rainfale but the heat is appressive till about August to excessive humidity. The mean maximum and minimum temperature varies from 32 c to 22° c. From Novemver to January the weather is cool and foggy. Real winter steps in December and lasts for about a month. The mean maximum and minimum tempareture varies from 24° c to 10° c during this period with very little or no rain at all.

The average annual rainfall at Guwahati is 1662.21 mm. about 90 percent of this rain occure between April to September,

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The average annual rainfall at Guwahati is 1662.21 mm. about 90 percent of this rain occure between April to September,

the maximum rainy months being July and August. The prevailing wind direction of Guwahati is from North-east to South-west during the winter months while during the summer it is from South west to North-east.

2.4.Urban Population and life style:-

2.4.1.Historical back ground of the city: The actual starting point of modern Guwahati dates back to the British Occupation of Assam in 1826 and it is from this date Guwahati come to have its due importance. It became a Municipal town in the year 1865 with the establishment of a Municipal Board in that year. This town was connected by railway line with rest of India in 1890. In 1891, the Popupalation of Guwahati was 1,2,3,783. Which is now 5,84,342 [census of India, 1993]. The Population of Guwahati has been raising rapidly.

2.4.2. Administative back ground of the city : The Municipal limit was also increased from 7.68 sqr.kms. in 1951 to 14 km in 1961 and at Present which is 216.19 sqr.kms. It is to became the first city of N.E. India in 1974, when Municipal Corporation was established. Apart from this importance as an administrative centre, it is considered as the econonic capital of Assam, besides its importance as a centre of Political, Educational, Social, Commercial and other activities in the entire Nort-east-ern region of the country.

Thus this rapid expansion and growth creat some complexity in terms of function and existance which also creat some hetereogeneity and problems in all spheres of the urban field including society and environment.

In Guwahati there is no any agricltural land but all vegetable items comes from the nearby small towns and rural areas. Urban peoples depends the nearby farmers for all the agricultural products. As a result wastedumping in market area creat a major environment problem.

In Guwahati, there is no specefic areas inhabitant by alternate section of people live in together. Pepples are not aware of conserving the nature. So day by day environment is going to polluted.

Due to Rapid increase of Industry and human Population, both air and water are becoming polluted. Most of the vehicle's exhaust and industry emission creat air pollution. Oil mill factories, Nurshing home creat water pollution. Dumping of garbage creat various types of diseases garbage leachate Percolate to the water storage [Ground water, surface water, Pond water etc.] and creat water borne diseases.

Garbage deposition system of all types of people are not scientific. People do not use dustbin. waste materials are dumped in the road side, even in the midst of the road. Dustbins

alloted to the area by the municipal corporation is not sufficient. Because the number of people is more than the capacity of the dustbins.

2.4.3. Impact of floating population in Garbage generation:-

(Guwahati is the main centre of trade and commerce of North East India.) Thousands of people come daily to Guwahati for various purposes like Service, Purchases, business and education. They come mainly from the nearby setelite township and village areas viz, Azara, Boko, Nalbari, Barpeta Road, Dhubri, Shillong, Bhutan etc. The rural business community which daily carries different vagitables and others and sold in the city market, which in term increases the quantity of garbage. Majority of the people comes early in the morning with vegetables and return in the evening.

(Thousands of vehicles mainly trucks of local and national permit holders comes to Guwahati carrying truck of local vehicle permits holders to Guwahati) carrying essential consumable goods. The handling of such materials also generate garbage. The floating population in the Guwahati city playes a major role in Garbage producing.)

(As the floating population donot consider the responsibility of cleaning the city, hence the garbage generation is always more than the expected quantity which could be produced by the local permanent residents.)

✓ 2.4.4. Impact of composite population in Garbage generation :- The Guwahati population is composite represented by almost all the types plain people both for the state and outside. Moreover a major tribal section of the state and nearby seven sister states also stay permanently or temporarily at Greater Guwahati. Assamese, Bengali, Nepali, Behari represent the major plain population, followed by Bodo, Rabha, Manipuri etc. The cultural life style of the various people is being strongly maintained resulting in the formation of the domestic sewage to a Particular pattern. But the cause and specific Pattern of garbage generation is from the availability of the item in the market Places.

✓ 2.5. Birds as Scavengers of Refuge in Guwahati.

Human activities are increasing the environment of Guwahati, as indeed they are throughout the country. Whilst many of the consequent changes have been detrimental to bird populations, there is a minority of species which has benefited. Within this category, three main groups of birds can be recognized on the basis of their feeding behaviour. The first group. Consists of species which feed on dead Plant and animal matter which man discards intentionally that is on refuse. The term 'Scavenger' is appropriate to these species. Secondly, there are the pests, which attack crops. Finally, there is an intermediate group of

which Pigeons and Sparrows are couscos examples, that, might be best described as 'Commensals'. They are distinguished from the other two groups, with which they overlap mainly in that their sources of food are usually dispersed and often very varied. A feature common to all three groups is that the species concerned are gregarious, although not necessarily social.

The major scavengers in the human environment in Guwahati are

Indian white backed vulture (WB)

Indian long billed vulture (LB)

House Crow (HC)

Jungle Crow (JC)

Pariah Kite (PK)

Greater Adjutant stork. (GAS)

Cattle egret (CE)

Jungle myna (JM)

Common myna (CM)

Pied myna (PM)

Of these vultures seems to be an obligate scavenger, feeding exclusively on dead animal matter. (The others facultative scavengers). Their diets are more catholic and may include live animals. It is safe to assume that scavenging behaviour evolved in all of these species before their food was augmented by man. Since

all can be found scavenging in natural situations, such as on carcasses of wild animals. But the scavenging behaviour of the species cattle egret seems to be a recent development which has not previously been recorded.

Indian white backed vulture

Order - Falconiformes

Family - Accipitridae

Scientific name - Gyps bengalensis

Local Name - Sagun.

Character - Adult and young as in the Indian race, but with the head and neck entirely bald and shining, Resident.

Habit - Usually seen in small groups Perched hunched up on tree tops and palms on the countryside, on roofs or walls in the vicinity of slaughter houses, municipal refuse dumps, Their eyesight is remarkably strong. They are so quick to discover a carcass on the countryside or any garbage centres. The flying bird detect a carcass by the movement of crows, dogs and jackals.

Food - Carcass, garbage etc.

Indian longbilled vulture

Order - Falconiformes

Family - Accipitridae

Scientific name - Gyps indicus

Local name - Sagun

Character - Adult and young as in the indian race, but with the head and neck entirely bold and shing. Resident uncommon in Guwahati.

Habit - Usually seen in small number. Perched hunched up on tree tops and Palms on the countryside, on roofs or walls in the vicinity of slaughter houses, municipal refuse dumps. Their eye sight is remarkably strong. They are so quick to discover a carcass on the countryside or any garbage countres. The flying bird detect a carcass by the movement of crows, dogs and jackels.

Food - Carcass, garbage etc.

Greater Adjutant stork

Order - Ciconiiformes

Family - Ciconiidae

Scientific name - Leptoptilos dubius

Local name - Hargila.

Character - The largest and ugliest of all storks, black, grey and dirty white with naked reddish and Yellow head and neck and a huge four sided wedge shaped bill.

Habit - Local migrant, Keeps singly or in small parties, stalking about the with martial gait or marshland, Particularly where the water is drying and concentrating the fishlife in shallow Puddles. When not actively feeding it spends the time standing.

The bird cansod freely with kites and vultures to feast on animal carcase dumped on the countryside.

Food - Fishes, Frogs, reptiles, Crustancans, and almost all manageable living things, live or dead.

Jungle Crow

Order - Passeriformes

Family - Corvidae

Scientific name - Corvus macrorhynchus

Local name - Dhora Kauri.

Character - Large uniformly black crow. Resident with slight summer winter altitudinal movement Jungle crow is larger than house crow.

Habit - Very useful as municipal scavenger and an indispersable ally to neglecful or incomponent sanitary administator Intelligent. Traditional community roosts especially in ancient banyan trees mangrove jungle, Coconut and forest Plantations.

Food - All embracing, Practically everything that can be eaten i.e. both animal and vegetative matter.

House Crow

Order - Passeriformes

Family - Corvidae

Scientific name - Corvus splendens

Local name - Pati Kaori.

Character - Medium sized crow. Resident : Subject to seasonal movement. Inseparable from human habitations; abundant to pest proportions in urban areas. Rare at small hill stations, but quickly spreading to them with population growth and increased garbage potential.

Habit - Very useful as municipal scavenger and an indispensable ally to neglectful or incomponent sanitary administrator. Intelligent. Has traditional community roosts, especially in ancient banyan trees, mangrove jungle, coconut and forest plantations.

Food - All embracing, practically everything that can be eaten i.e. both animal and vegetative matter.

Pariah Kite

Order	-	Falconiformes
Family	-	Accipitridae
Scientific name	-	<u>Milvus migrans</u>
Local name	-	Chilani

Character - A large dark fulvus-brown hawk distinguishable from all similar birds of prey by its deeply forked tail, Particularly conspicuous in flight. The species is Resident. Locally migratory.

Habit - A confirmed commensal of man; useful and efficient scavenger, hauning the precincts of slaughter-houses, fish

markets, refuge dumps harbours and bazaars. Will swoop and carry off a dead rat or other titbit lying in the middle of a congested throughfare, turning and twisting with masterly adroitness to avoid the tangle of overhead electric wires and the bustling traffic below. Prefer garbage and offal to sharing large animal carcasses with vultures.

Food - Largely omnivorous. Chiefly offal and garbage in urbanized areas. Saunters about to pick up earthworms on watered lawns. Winged termites awkwardly hawked in the air. The insects seized in the talons and head bent down to transfer them to bill. Among stomach contents the following insects have been identified : Grylotalpa africana, chrotogonous sp., Brachytrypes achatinus in addition to mice, lizards, frogs, chickens and kitchen refuse.

Cattle egret

Order	-	Ciconiformes
Family	-	Ardeidae
Scientific name	-	<u>Bubulcus ibis</u>
Local name	-	Go bagali.

Character - In non-breeding plumage a lanky snow-white bird, very similar to little egret, usually seen in attendance on grazing cattle, not necessarily near water. In breeding plumage unmistakable; golden buff on head, neck and back, the feathers disintegrated and hairlike, sexes alike.

Habit - Gregarious. Usually seen in attendance on grazing village cattle on damp grassy margins of tanks as well as dry fallows and forest glades far removed from water. Also with grazing herds of wild buffaloes, or rhinoceros walking in swamps and beels. The birds stand around amongst or on the back of the animals' progress. To capture blue bottle flies of the low herbage, the bird poises its bill, cranes forward and sways its neck comically from side to side as if taking aim, and jabs at the insect.

Community - Besides attending on cattle they some times collect in large gathering at inundated ploughed fields where the freshly turned up soil provides ample feeding. They consort freely with vultures at slaughter-houses and animal carcasses dumps on the outskirts of towns, for the flies and maggots these unsavoury places provide. Cattle egrets have favourite roost trees, shared with crows, mynas and other birds.

Food - Chiefly insects. They are found to eat Sarcophagidae. Agrotis sp. larvae, Chrotogonus spp. Acridium acruginosum and other grasshoppers, carabid beetles, earth worms and flies. To a minor extent tadpoles, frogs and lizards also.

Pied myna

Order	-	Passeriformes
Family	-	Sturnidae
Scientific name	-	<u>Sturnus contra</u>
Local name	-	Kankurika

Character - A trim black and white myna with conspicuous deep orange red orbital skin and bright orange-yellow bill. Resident with some seasonal local movement. Affects open cultivated well-watered country in the vicinity of human habitations dump grazing grounds, margins of tanks, sewage farms, municipal refuse dump etc.

Habit - Sociable, predominantly insectivorous and ground feeding. Keeps in small parties commonly in association with other mynas. Refuse dump, cattle pens and marshy grazing land are favourite feeding grounds.

Food - Insects, fruit and cereal grain, flower nectar, grasshopper, beetles, ants, caterpillar and grubs.

Common myna

Order	-	Passeriformes
Family	-	Sturnidae
Scientific name	-	<u>Acridotheres tristis</u>
Local name	-	Ghar salika

Character - A pale edition of adult, duller, less dark brown, with the head ashy brown rather than black. Resident; ubiquitous, common and familiar bird.

Habit - Along with the crow and sparrow a confirmed commensal of man, quick to colonize virgin areas. Feeds on trees as well as ground. Roosts communally in large leafy trees, coconut groves, sugarcane fields.

Food - Chiefly fruit, grain, insects and grubs but also everything else that can be eaten; kitchen scraps, titbit from refuge dumps, small animals like mice, frogs, lizards and crabs and flowers nectar.

Jungle myna

Order	-	Passeriformes
Family	-	Sturnidae
Scientific name	-	<u>Acridotheres fuscus</u>
Local name	-	Chutia salika.

Character - Resident. Patchily distributed and subject to seasonal local movements. Affects well wooded area in the neighbourhood of cultivation, forest villages, and tea gardens, etc. chiefly in the foot hills.

Habit - Not markedly different from common myna but is less commensal with man keeps in family parties and flocks of 10 to 30 or so, commonly in attendance on grazing cattle. Large communal roosts in sugar cane fields.

Food - Fruits and berries, grain, flower nectar and insects.

Method

2.6 Survey of Garbage Centres - The garbage centres which were categorised into large, medium, and small or scattered were

survey throughout the greater Guwahati area. The survey was done during the period from December, 1994 to May, 1995. The Municipal map and records of the garbage centres were taken for one of the basis for the survey.

The survey covered all the Municipal wards and other greater Guwahati area. The survey covered all the lanes and by-lanes apart from the main road of greater Guwahati. The identified garbage centres were recorded and categorised. The quality of the garbage generation were studied and recorded [as per Shukla and Srivastava, 1992].

2.7 Survey of Scavenger Birds - The population of the scavenger birds is the indication of the consumption potential of the organic garbages in the city. Hence, the population of the scavenger birds in the pre-selected garbage centres were done.

The population of the selected scavenger birds were estimated by countings [as per Pumeroy, 1975] in the morning with hour [5:00 to 8:00] in each garbage centres which were away from each other atleast by 1 km. The evening counting is also done in the same centre and the population is recorded. Population were recorded in the specific special site.

2.7. Prevelage of diseases : The survey of the public health diseases and the generation of vectors which are capable of transmitting the deseases are recorded. The survey covered -

- a) The public health diseases - which are water borne
- b) The public health diseases which are air borne
- c) The vector dependant diseases
- d) Intermediate hosts of the transmitted diseases.

The survey procedure covered -

- 1) Data collection - diseases frequent from hospitals/doctors.
- 2) Interview with doctors.
- 3) Survey of the animal community at the garbage centres and indentify the Carrier, transmission and intermediate hosts.

All the data generate are recorded for analysis.

3.Result

3.1.Garbage situation and garbage generation

Garbage situation : Storage of waste in community bins is genetally found to be unsatisfactory as people are aften reluctant to walk to the communal bins and hence dump the waste on side walks , streets or open drains. Even when they do find their way to the communal bin, they tend to throw the waste from a distance, in the process missing the bin altogether and scattering the waste all around the bin. This creats not only unhygenic conditions in the area but also difficulties for the municipal staff in collecting the waste for transportation. In the case of masonry waste collection structures, waste from the corner of the walls remains uncollected and starts decomposing.

It has also found that these garbage bins are often situated at unsuitable locations. Location being an important determinant of acceptance or rejection of a facility, it is not surprising that in such cases people prefer throwing garbage at any other convenient place.

Garbage generation

Because of the rapid urbanization and increase in human settlement and influse of the floating population in Guwahati there was a quantum jump in garbage generation. Garbage being a multidimensional and multisource waste product is extremely difficult to tackle in the developing countries in ecological and environmental term. The organic source of garbage have the potentially vista for generating multiple of known as well as undetected diseases associated with public health.

a) Garbage generation under Guwahati Municipal area :- (Generally garbage generated near the roadside of human habitation and junction of roads from the commercially important sources like market, hotel & restaurent etc. Common people of the Guwahati city is not aware of environmental issues. So they dump their waste material near the house and infront of his house.)

The Municipal authorities unable to provide number of dustbins as per population in specific area and as per requirement. The people dump the domestic waste anywhere near the roadside or drains. Some people even dump the garbage in the middle of the

road and over the waste, vehicles are passed and scattered the waste anywhere. These wastes are often washed away during rain and get accumulated in the drain which blocks the narrow drains which ultimately forces overflowing of the drains.

The major waste dumping place of Guwahati is at 'Barsapara'. The Guwahati Municipal Corporation decided to create a play ground at Barsapar by land filling the area with municipal waste. Per month average 2000 trucks of garbage dumped in Barasapara for land filling. In the main busy area of the city are cleared everyday by the municipal man with the help of trucks and disposed in Barasapara. Moreover, trucks and municipal official are not at all proportional per day generation of garbage in the city area. In some area no waste materials are removed from the dustbin and dumping centre of roadside for weeks together. These are eaten by the bird and decomposed automatically. Even in some area dumpings are removed in 3-4 day of intervals.

b) Garbage generation and disposal under capital complex :

In the capital complex of Guwahati waste materials are removed by the Directorate of Municipal Administration Dept. They clear the waste material with the help of an old and outdated tractor. Waste materials are dumped in the G.S. Roadside of sluice gate (now super market area of Dispur). Dead bodies and major Kitchen scraps are dumped in Barasapara trenching ground.

Maximum available number of dustbin found only in the capital complex area of Dispur. But due to lack of environment awareness some people dumped the waste in the street corner. Two trucks of garbage generated in the capital complex perday.

- X c) Garbage generation and Disposal at railway colony :- North-east frontier railway headquarter is at Guwahati. The garbage generated from the railway colonies is also very high quantity. No proper disposal method followed by the railway authorities for disposal of waste materials created by the employees from the residential quarters.

Pandu, Maligaon, New Guwahati and Guwahati railway station colonies are also main waste product area and comes under railway authorities. Authorities dumped the waste material near the railway tracks. In New Guwahati area they dumped the waste in the east end of the New Guwahati Diesel Shed complex and the both side of the tracks. Few years ago they disposed the waste at the low lying area of Narengi. In Pandu, waste materials used as landfilling near the railway tracks and lowlying area of the railway land near the old railway station area. In Maligaon waste materials are dumped at backside of the Kendriya Vidyalaya for landfilling and both side of the rail line. In Guwahati railway station area, waste materials are transfered to the lowlying area with the help of truncks for landfilling. They also dumped the waste products in the side of the railway line Railway colonies

also lack if proper quantity of dustbin. Dumping centre are found in the street corner of the busy human habitation area.

✓ **3.1.1. Garbage centres** From the survey of garbage centres it is clear that no proper garbage dumping place found in the Guwahati Municipal area. Scattered dumping centres are remarkable in various routes and garbage generating places. Registered or Municipal dustbins are found in the place. These all are not functionable. Some are damaged by public or by natural calamities. Some are taken by the people to nearer his house.

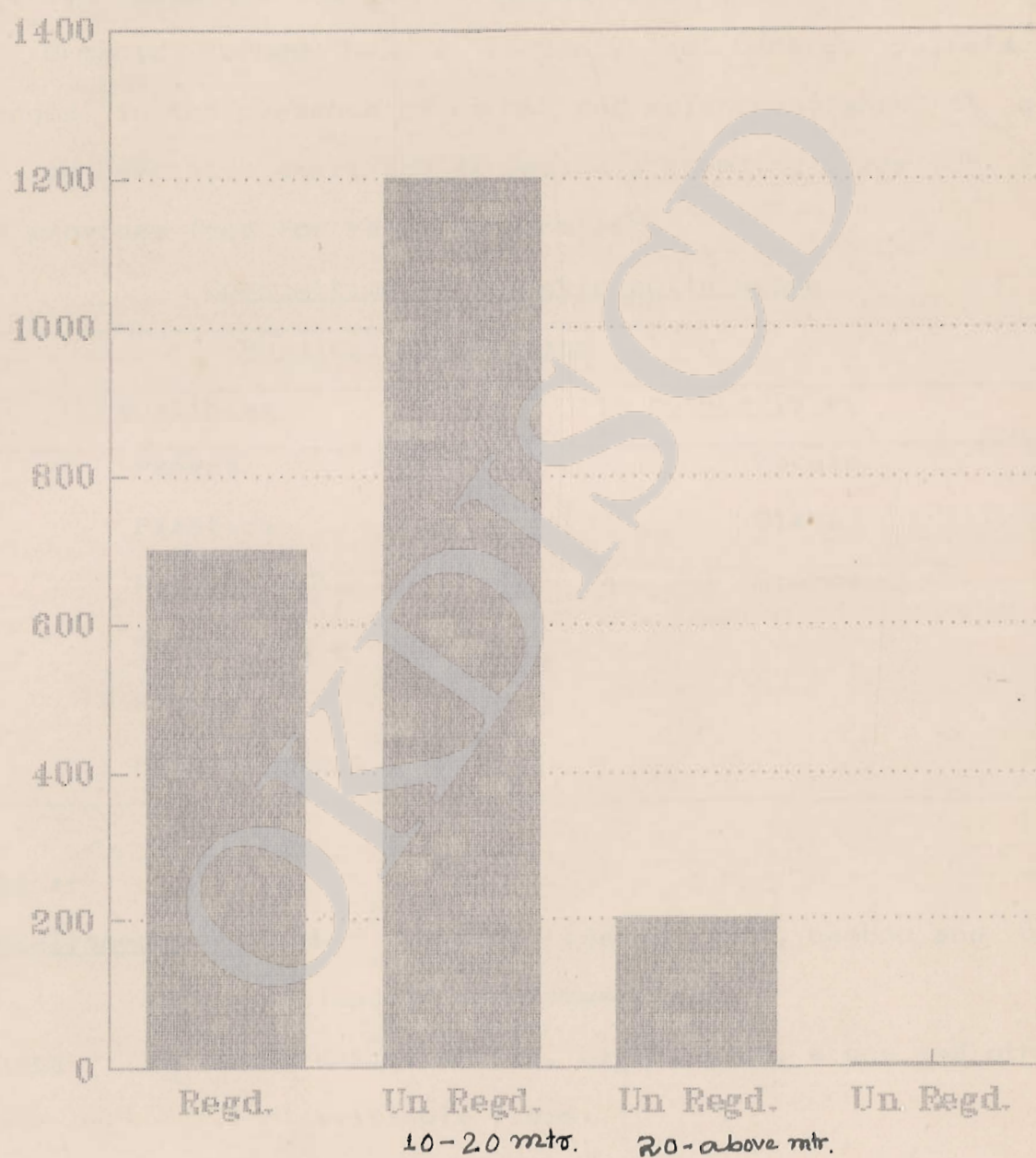
(Maximum number of garbage centres found in the road side, street corner market place and human habitation. Location of this centres varies day by day.) The area of these centres from 5-10 metres. This type of garbage centre found in haphazard manner.

Another type of garbage centres found whose diameter is nearly 10 - 20 metres. This types of centres have permanent location. from 20 mtrs to above diameters of garbage centres found in the municipal area. This type of garbage centres have also a permanent type of location.

Trenching ground is a sanitary landfill area. Where all garbages producing in Guwahati are dumped.

✓ **3.1.2 Garbage quality:** Leaves, Vegetables and parings, rotten fruits, fruit skin, kitchen waste, market waste, dead bodies etc

GRAPH - GARBAGE CENTRES



Series 1

of urban waste are the main diseases causing components.

Organic refuse has a tendency to undergo putrefaction changes in the presence of warmth and moisture, when it gives off an offensive smell and serves as a breeding place for flies and provides food for rats, vermin etc.

Composition of domestic solid waste

<u>Physical composition</u>	
<u>Combustibles</u>	<u>In combustibles</u>
Papers	Metals
Plastics	Glass
Kitchen waste	Others
Market waste	
Fibres	
Miscellaneous	

Note :-

Miscellaneous - Rubber, Leather, leaves, wood, bamboo and other unclassifiable items.

Others - Ceramics, shells, earth, sand, stone and other classifiable items.

✶ 3.1.3. Garbage Ecology

It has been seen that the garbage production and deposition is a dynamic system. The garbage when deposited are subjected to various environmental influences including the pressure

generation from the subsequent deposition of the qualitatively similar or dissimilar garbages. A specific frame of the garbage deposit is formed immediately after the deposition of the garbage at a point. It takes some time to take a permanent shape and setup. The degradable and non degradable component combined together to form a setup which becomes the ultimate guiding factor for the micro habitat creation for vector and the direct pathogenic components etc. The climate has got a major influence on that ecological setup. It is to be noted that the dynamics of the garbage setup are the guiding force for creation of the habitat for various germs and species time to time. Moreover, the garbage setup is normally left as such without any form of interference and hence the natural phenomenon and various scientific interactions take place uninterrupted.

✓ 3.1.4. Garbage implications in disease

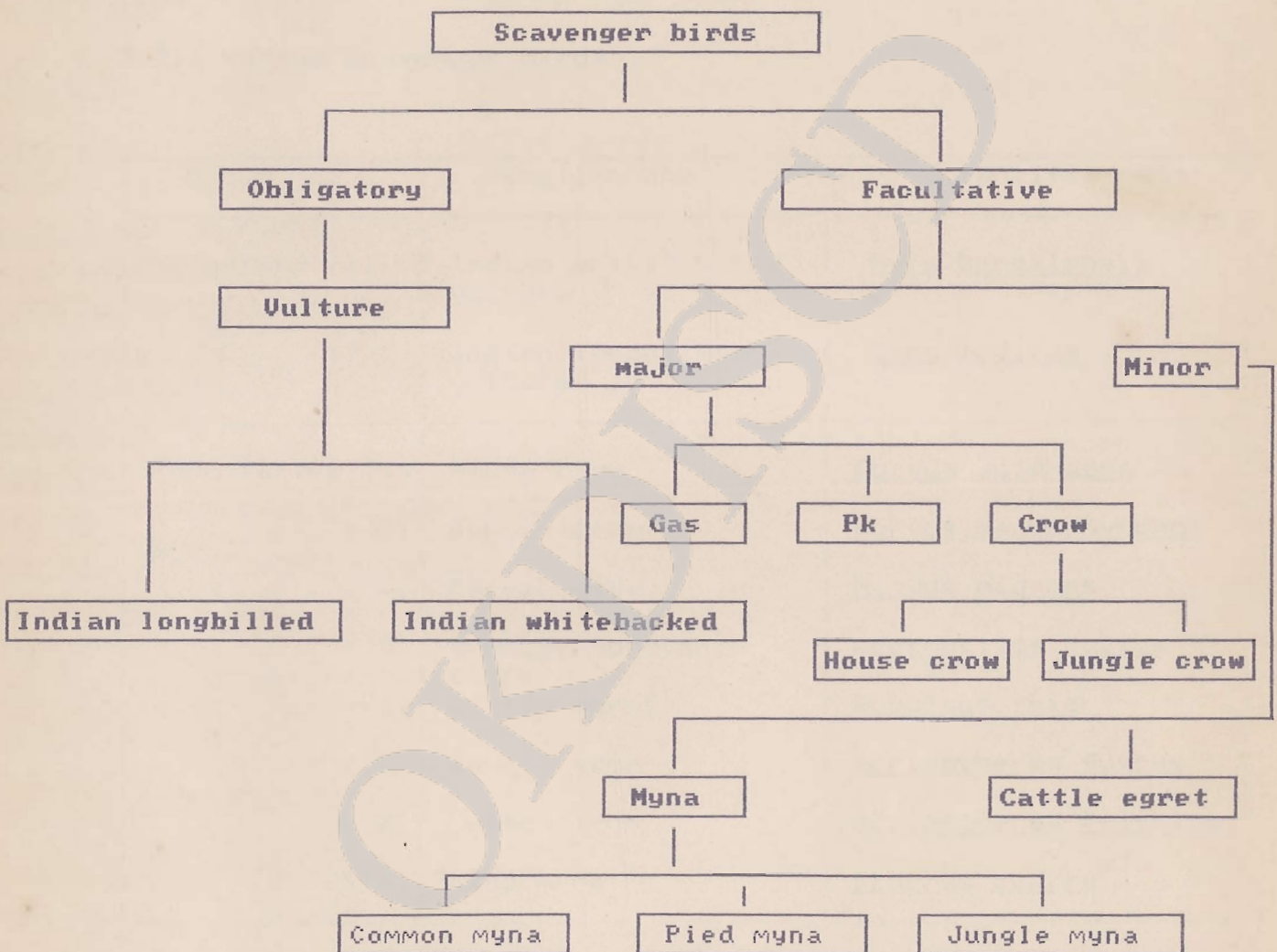
The point of the origin of the diseases particularly of the live forms (Germs - bacterial, viral and protozoan) is not constant. The major garbage centres are of course, the site of the generation of the diverse groups of germs. But the production and Population of the Pathogenic germs are not site specific. As mentioned earlier the ecological situation of the quality and possibly the location guides the production or origin of such germs. This may, thus vary year after year and even season to season. The production of the pathogenic component in a garbage

setup is not the ultimate factor for disease transmission. A number of factors guide such infectious setup. The distance of the human habitation from the spot of the origin of the germs. The equal proportion of the production of the vector, synchronizing with the germ production is the key factor for the transmission of the disease.

The smaller permanent garbage centres or scattered temporary garbage centres ecological situation is quite different from the permanent garbage centres. The smaller garbage centres when more in number and area scattered may often fail to satisfy the ecological condition required for the generation of the pathogenic germs. Aesthetically, they are of low value but for an easy accessibility of the scavenger avifauna particularly the minor facultative ones they get easily cleaned, leaving some non biodegradable components not sufficient enough to generate the conducive condition for the production of the disease causing pathogenic life forms and the subsequent vectors. It is to be noted that the pathogenic life forms. Production is not enough for the disease transmission, but the quality and Population of the vector ultimately decide the health problem which in turn varies drastically in various locations.

One very important point to be noted is that the site of the origin of the garbage where some preexisting diseases were there, may be transported with the garbage to the permanent site or disposal which may interfere, if ecologically suitable habitat

3.2.1.



are created may magnify the disease problem by rapid multiplication.

3.2.1 Varies Scavenger birds

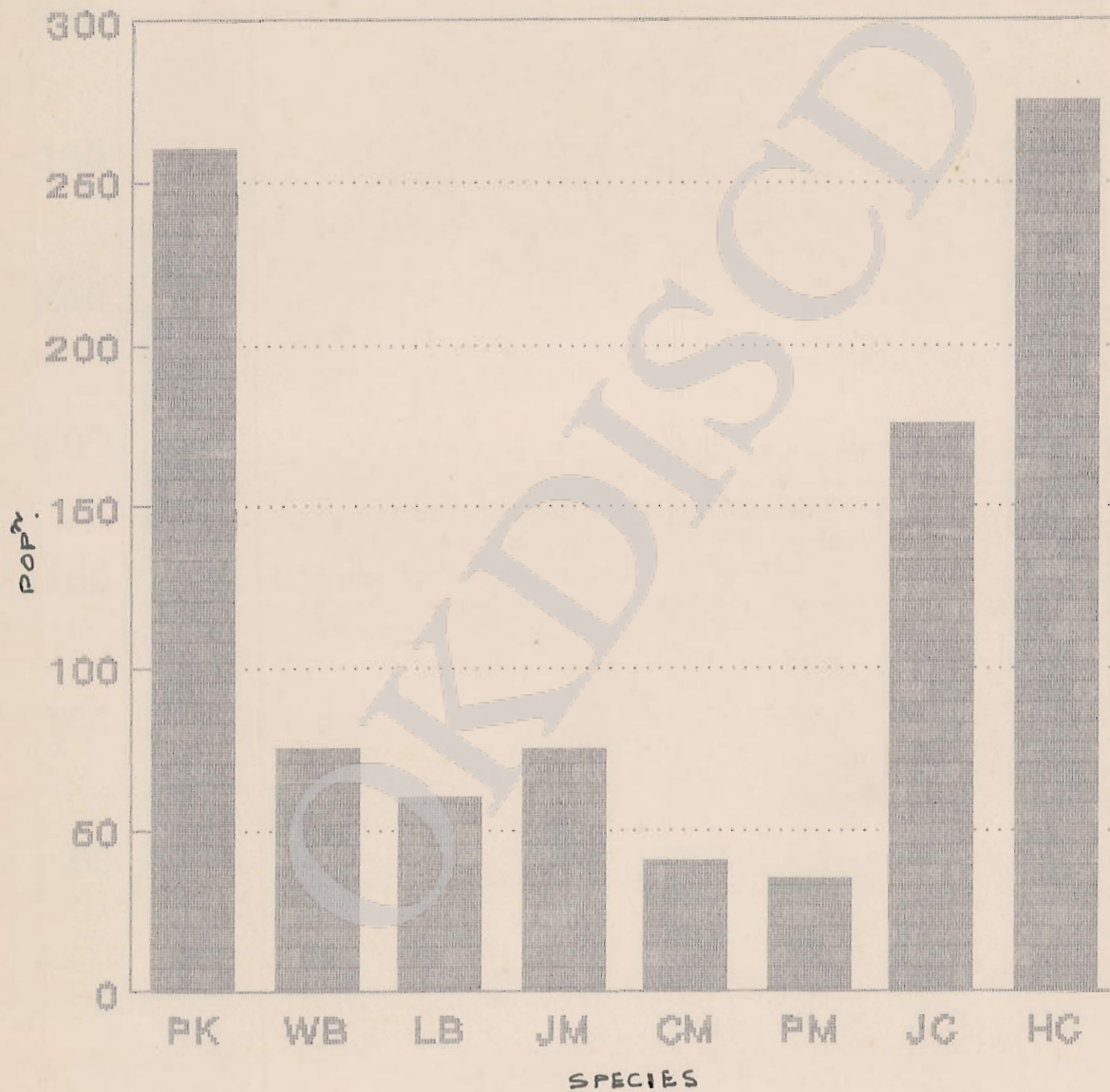
Group	Englishname	Scientific name
Obligatory (1)	Indian white backed vulture	<u>Gyps bengalensis</u>
	(2) Indian longbilled vulture	<u>Gyps indicus</u>
Facultative/ (1)	House crow	<u>Corvus splendens</u>
	(2) Jungle crow	<u>Corvus macrorhynchos</u>
	(3) Pariah kite	<u>Milvus migrans</u>
	(4) Greater Adjutant stork	<u>Leptoptilos dubius</u>
Major	(1) Cattle egret	<u>Bubulcus ibis</u>
	(2) Jungle myna	<u>Acridotheres fuscus</u>
	(3) Common myna	<u>Acridotheres tristis</u>
	(4) Pied myna	<u>sturnus contra</u>
Minor		

3.2.2. Population of Scavenger birds

(The population of scavenger birds were estimated during the period December 1994 to May 1995, the method of counting varied with the locality.)

(The scavenger birds in Guwahati are particularly numerous at the garbage centres near market place and are referred as

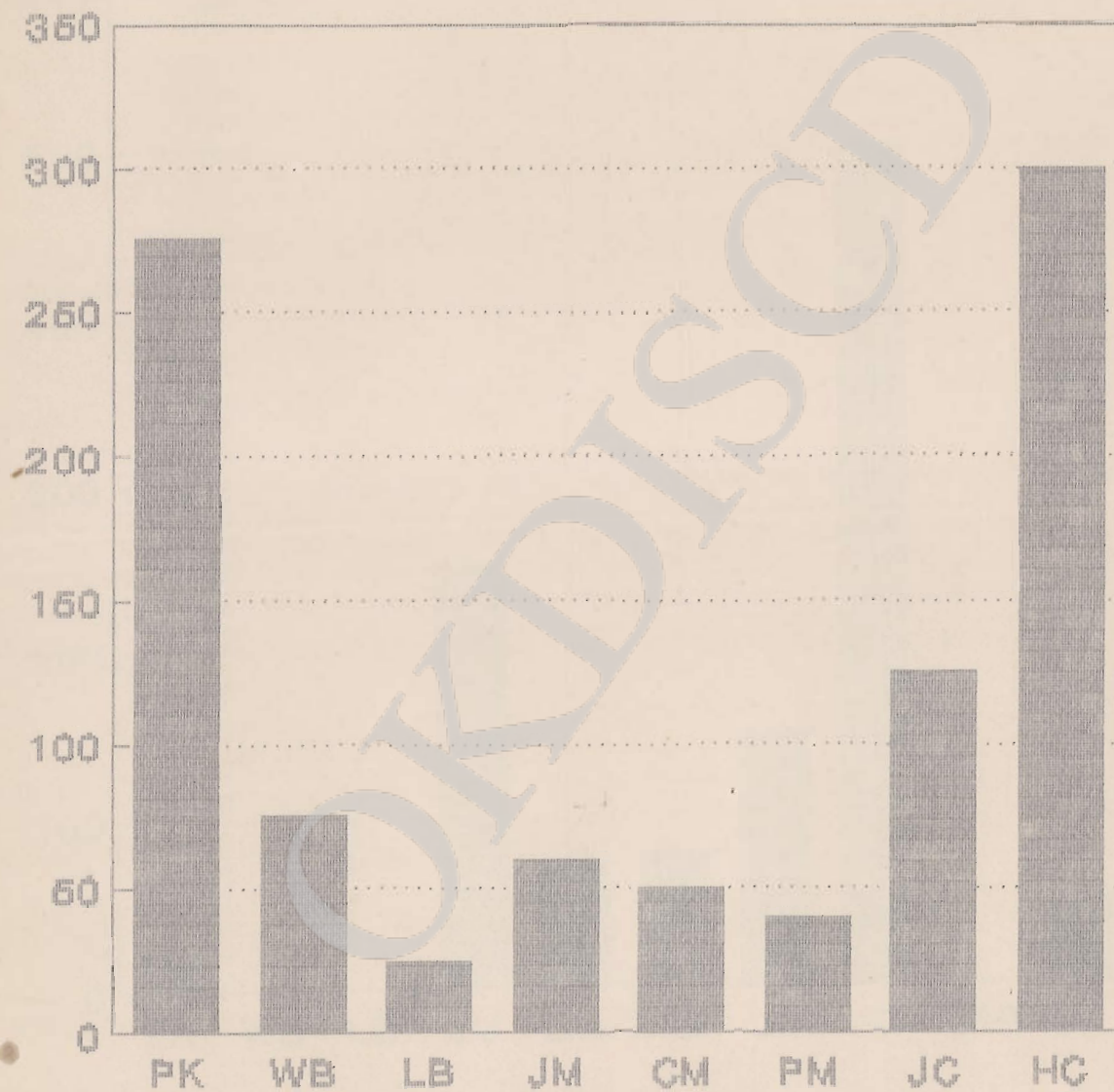
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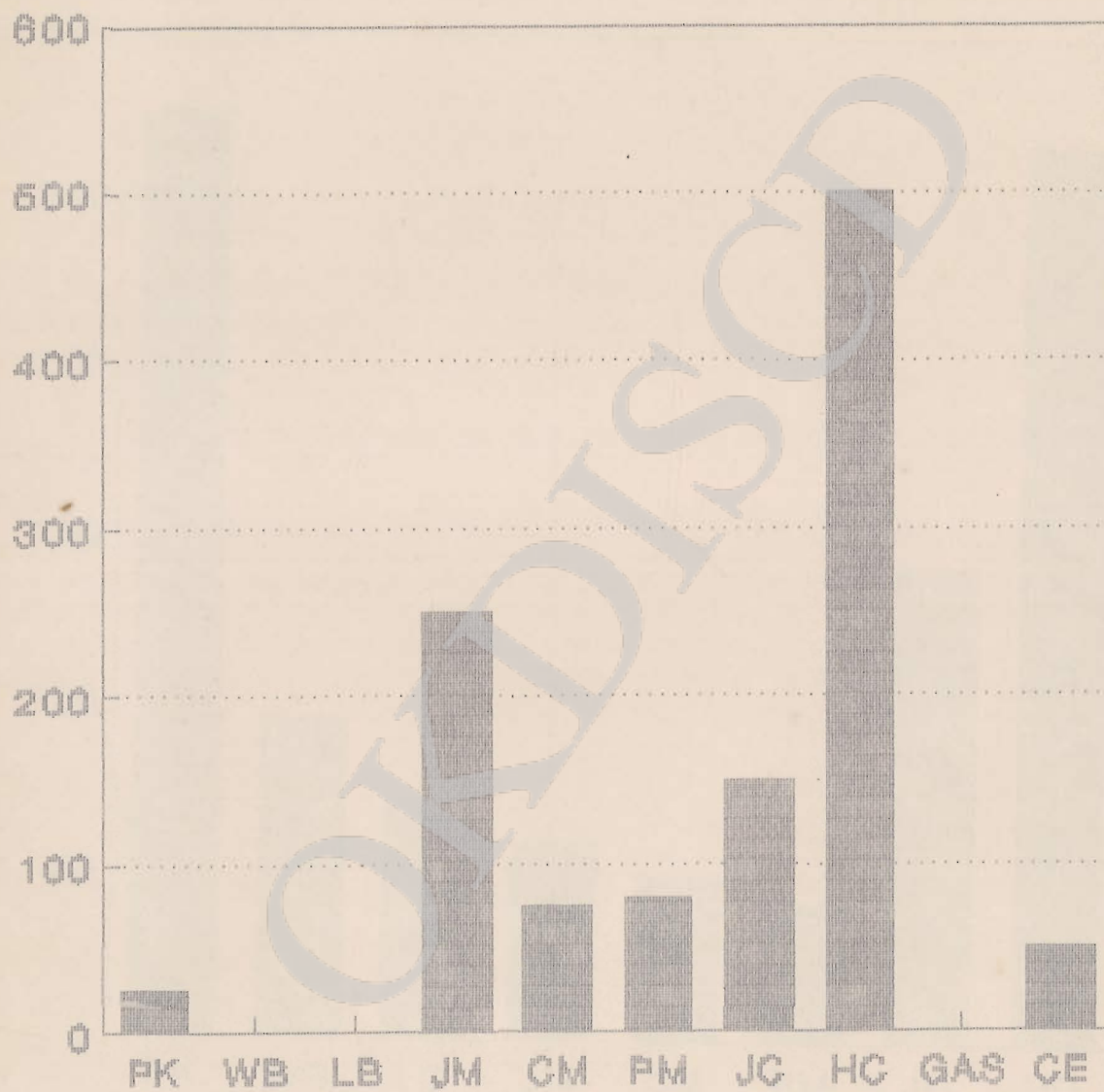
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KHANAFARA

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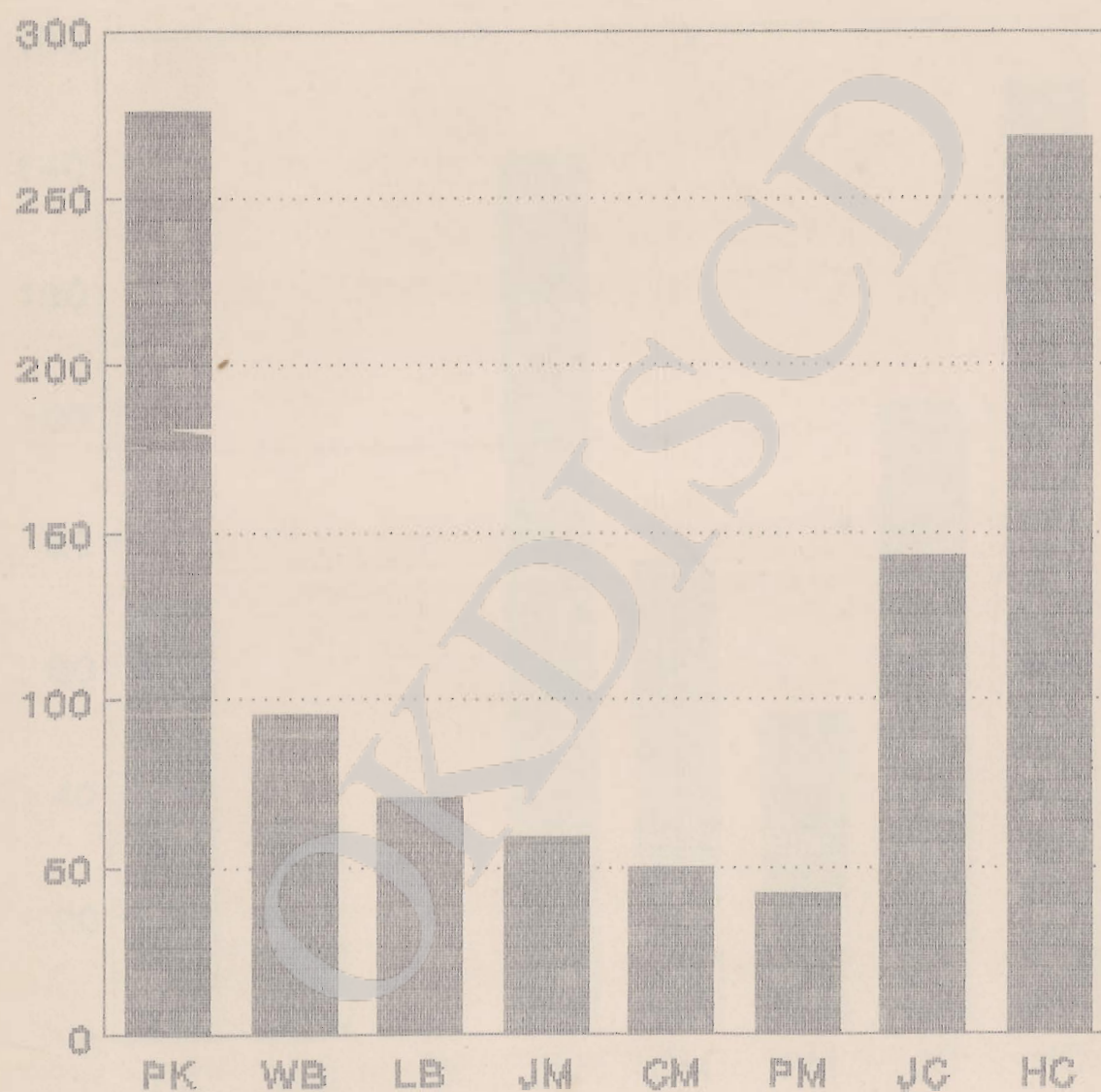
GRAPH NO - III



BHARALU

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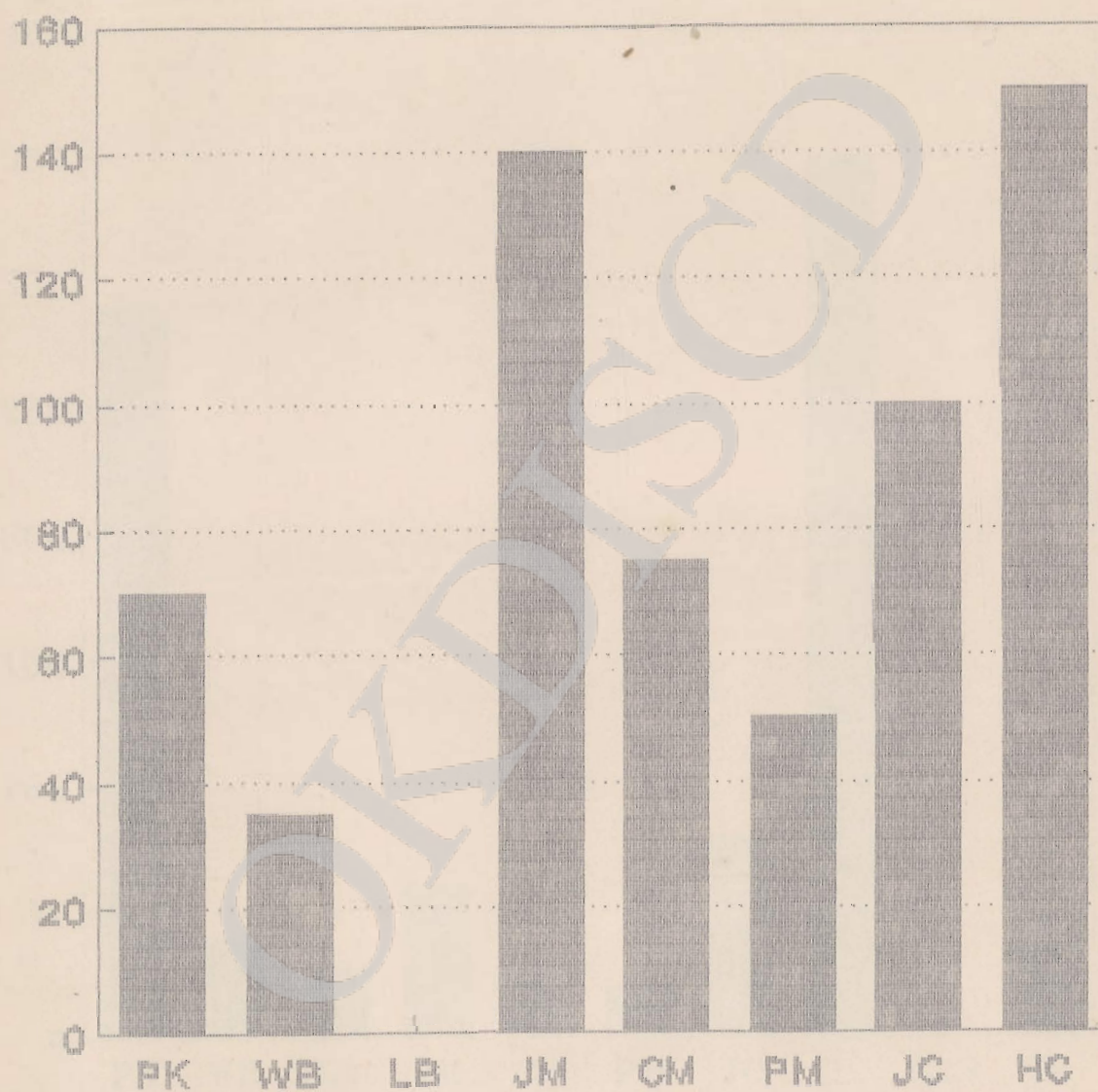
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FANCY BAZAR

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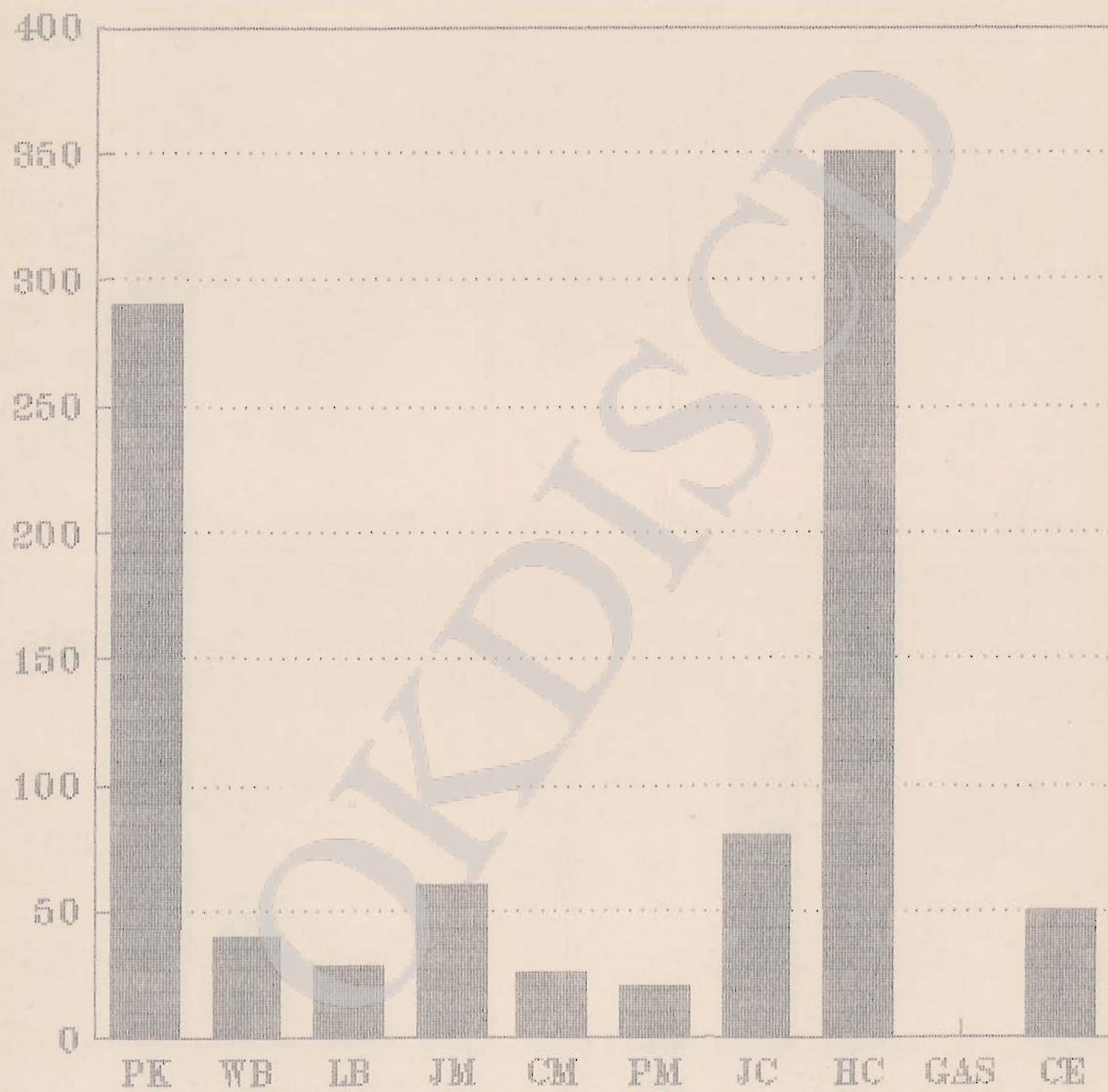
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ULUBARI

Series 1

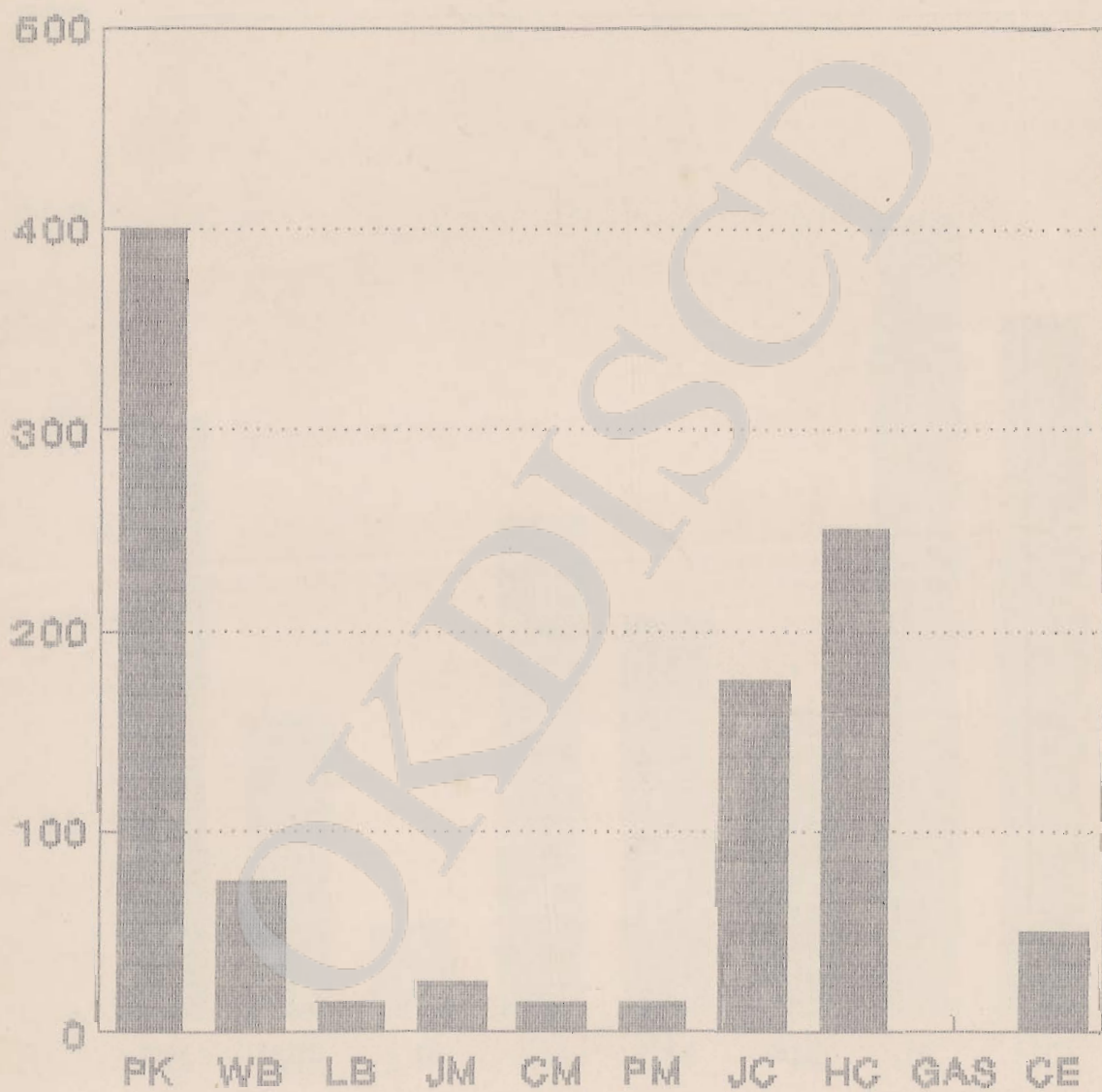
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PAN RAZAR

Series 1

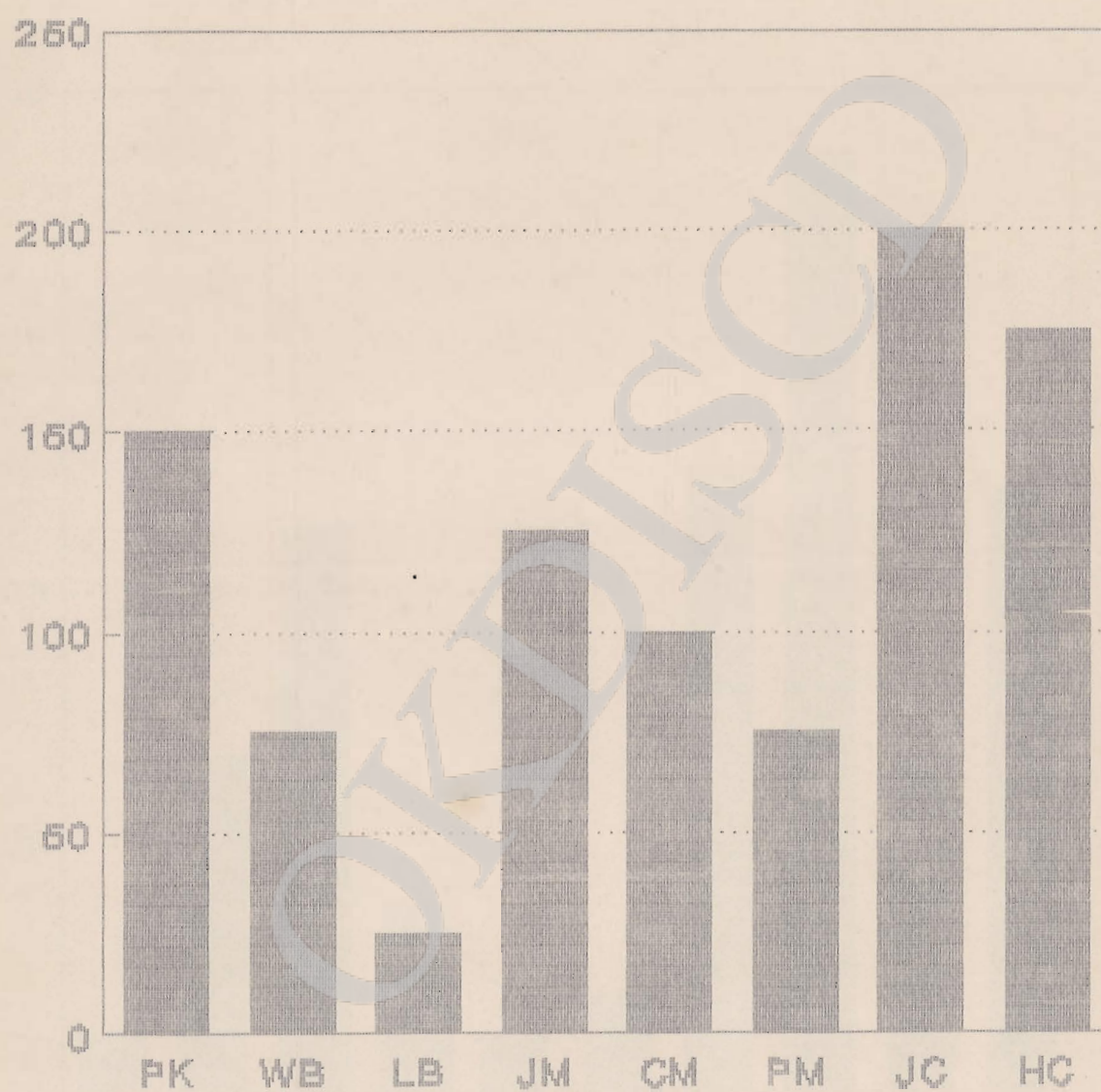
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PALTAN BAZAR

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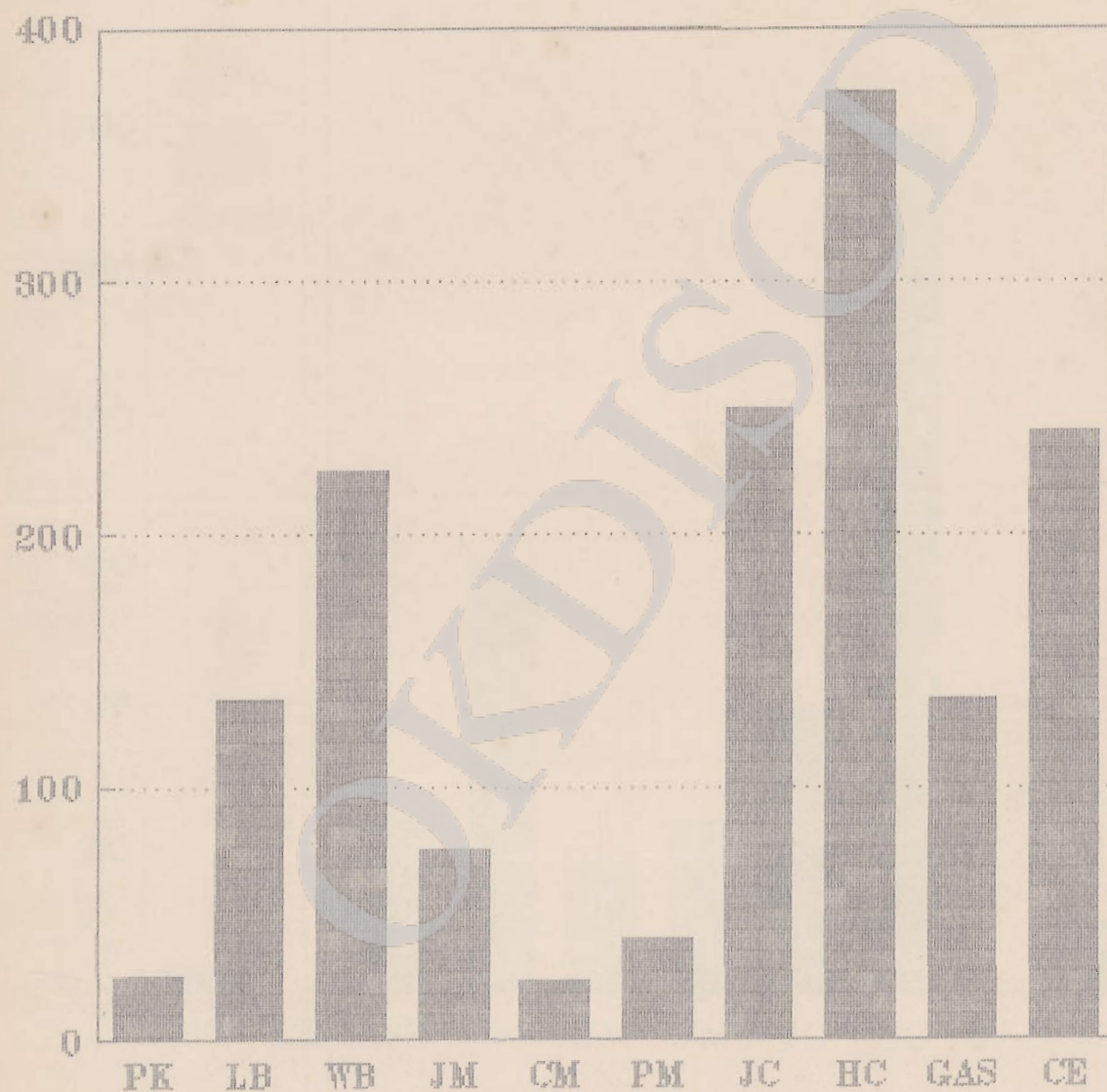
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MALIGAON

Series 1

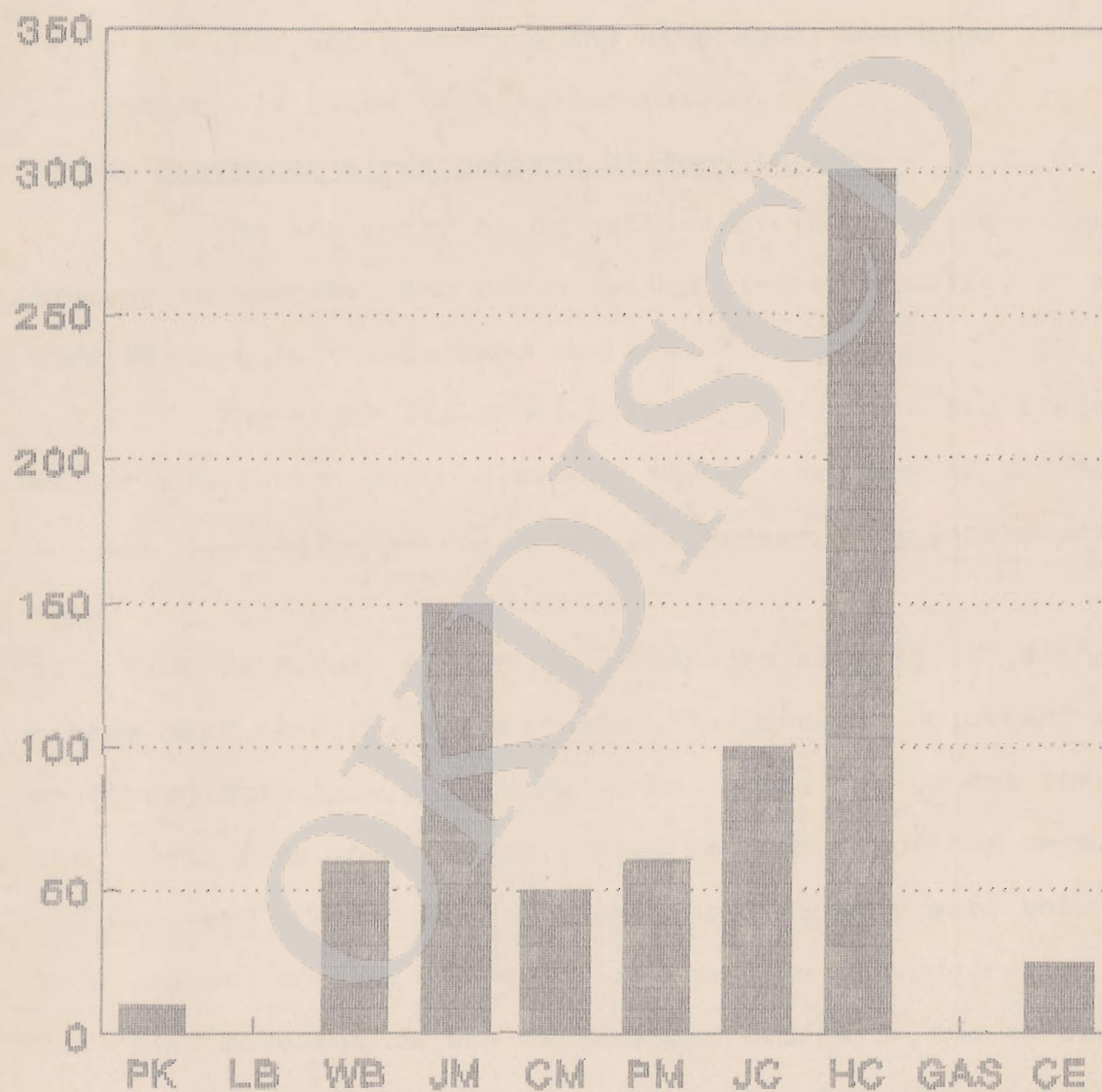
GRAPH NO. - IX



KAHILIPARA

Series 1

GRAPH NO - X



KALAPAHAR

Series 1

special sites. Here counting done near the special sites twice daily in the early morning and afternoon. Average numbers of population was taken into consideration.)

✓ 3.2.3. Scavenger birds pattern of food intake

The scavenger birds pattern of food intake varies from species to species, and often varies with the quality of the food item left out in the garbage centres.

The major scavenger bird species which are large sized, higher population and efficiency of the recovery of the food item in the garbage centres. A few pattern of food intake is given below.

1. The vultures with curved beak are capable of tearing out the pieces of meat from the carcass body. The Greater Adjutant stork - which can only take up pieces of the meat, but cannot tear out the flesh from the carcass, often catches hold of the neck of the vulture and forces it to regurgitate and finally eat the pieces. This suggests an interdependence amongst the scavengers.
2. The movement of the vulture and storks on the garbage centres exposes the minor live or dead animal carcass for the consumption of minor scavengers.
3. The crows are the first scavenger group which consume the animal carcasses, left on the road due to various road accidents. The large scavenger birds cannot reach in such minor sites.

4. The herbivorous scavenger like the cattle while active in the garbage centre - exposes - mainly insects, workers, centipeds, millipeds, larval forms of various insects which are in turn being taken by facultative smaller scavenger birds like myna or cattle egrets.

5. The scavenger like stray dogs are almost site specific. They consume little garbage materials but during the searching they also expose a number of live animals, which in turn being consumed by the scavenger birds.

6. The omnivorous birds like the myna - takes up the waste grains, seeds of rotten vegetables and fruits.

3.2.4. Food items of the scavenger birds

The scavenger birds are of public health importance because of the pattern of the intake of food items, and the versatility of the species concern with regard to the selection of the feeding sites and efficiency by which it takes up the food items. There are various types of scavenger birds their behaviour pattern and food intake mechanism are governed by -

- a) The genetical characteristics mainly in the beak structure and behaviour pattern.
- b) Stenophagic or euryphagic nature of food intake.
- c) Food item detection capability.
- d) Range (Period) of decay organic materials which they take.



Plate - Vulture scavenging garbage



Plate - Greater Adjutant Stork scavenging garbage



Other garbage animal community

Place - Greater Adjuntas State scavenging garbage



Plate - Cattle egret scavenging garbage



Plate - Crows scavenging garbage

The food item of scavenger birds varies from live forms (which may be both vectors or non vectors), carcasses, decayed for a short period, decayed for a longer period, but the food characteristics remained intake. Moreover, there are cases where some vegetable parts are also be eaten along with the animal parts, unintentionally.

3.3.1. Types of vectors

The common disease carrier vector are -

Mosquito

Housefly

Sandfly

Tsetesfly

louse

Rat flea

Bleckfly

Reduvid bug

Hardtick

Soft tick

Trombiculid mite

Itch mite

Cyclops

Cockroach

Snail

Rat.

3.3.2. Types of disease

A number of diseases are associated with parasites. The pathogenic effects with species concerned are -

Protozoal Parasites

Species	Pathogenic effects
<u>Amoeba histolytica</u>	Amoebic dysentery
<u>Giardia intestinalis</u>	Diarrhoea, Giardiasis
<u>Trichomonas vaginalis</u>	Trichomoniasis
<u>Trypanosoma Gambiense</u>	Sleeping Sickness, Trypanosomiasis
<u>Leishmania donovani</u>	Kala-azar, Leishmaniasis
<u>Plasmodium vivax</u>	Malaria
<u>Balanidium Coli</u>	Dysentery

Helminth Parasites

Species	Pathogenic effects
<u>Ancylostoma decodenelis</u>	Ancylostomiasis, Hook worm
<u>Ascaris lumbricoides</u>	Ascariasis, Round worm
<u>Wuchereria bancrofti</u>	Filariasis
<u>Tacnia solium</u>	Tacniasis
<u>Onchocerca</u>	Onchocerciasis, skin disease river blindness

Bacterial

Species	Pathogenic effect
<u>Salmonella typhi</u>	Enteric fever
<u>Salmonella paratyphi</u>	
<u>Vibrio cholera</u>	Cholera
<u>Shigella dysenteriae</u>	dysentery
<u>E. Coli</u>	Gastro enteritis, bacillary dysentery
<u>Leptosira icterohaemorrhag</u>	Leptospiiral jaundice

Viral

Species	Pathogenic effect
Polio myelitis	inflantile Paralysis
Epidemic infective Hepatitis	Contenhal jaundice
Cytomegalovray	Viral hepatitis
Yellowfever	yellowfever

3.3.3. Rodents and diseases

A number of diseases are associated with rodents. These are -

Bacterial	Plague, Tulerania, Salmonellosis
Viral	Lassa fever, haemorrhagic fever, encephalitis
Parasitic	hymenolepsis diminuta, leishmaniasis amoebiasis, trichinosis, chagas disease
Others	rat bite fever, leptospirosis, histoplasmosis ring worm etc

[Source - Sharma, P.D. 1991-92 ecology & environment]

3.3.4. Water Pollution, leachate and water-borne diseases

Waste causes serious health problems. The runoff during the rainy season causes the spread of the wastes whereas percolation of leachates often causes ground water contamination with the result that the entire aquifer systems get contaminated.

The contaminated water interm cause water borne disease which are preventive and common in and around Guwahati as follows

/-----\	
Those caused by the prsence of an infective agent	

a) Vial	Viral hepatitis, Poliomyeletis

b) Bacteria	cholera, typhoid, Paratyphoid, bacillary, dysen-
	tary, E. Coli. diarrhoea, Rota Virus diarrhoea

c) Protozoal	Amoebiasis, Giardiasis

d) Helminthic	Round worm, whip worm, thread worm hydatid
	disease

e) Leptoshiral	weill's disease

Those due to the Presence of an aquatic host.	

a) Cyclops	1) Guinea worm Fish tap worm

Snail	Schistosomiasis

\-----/	

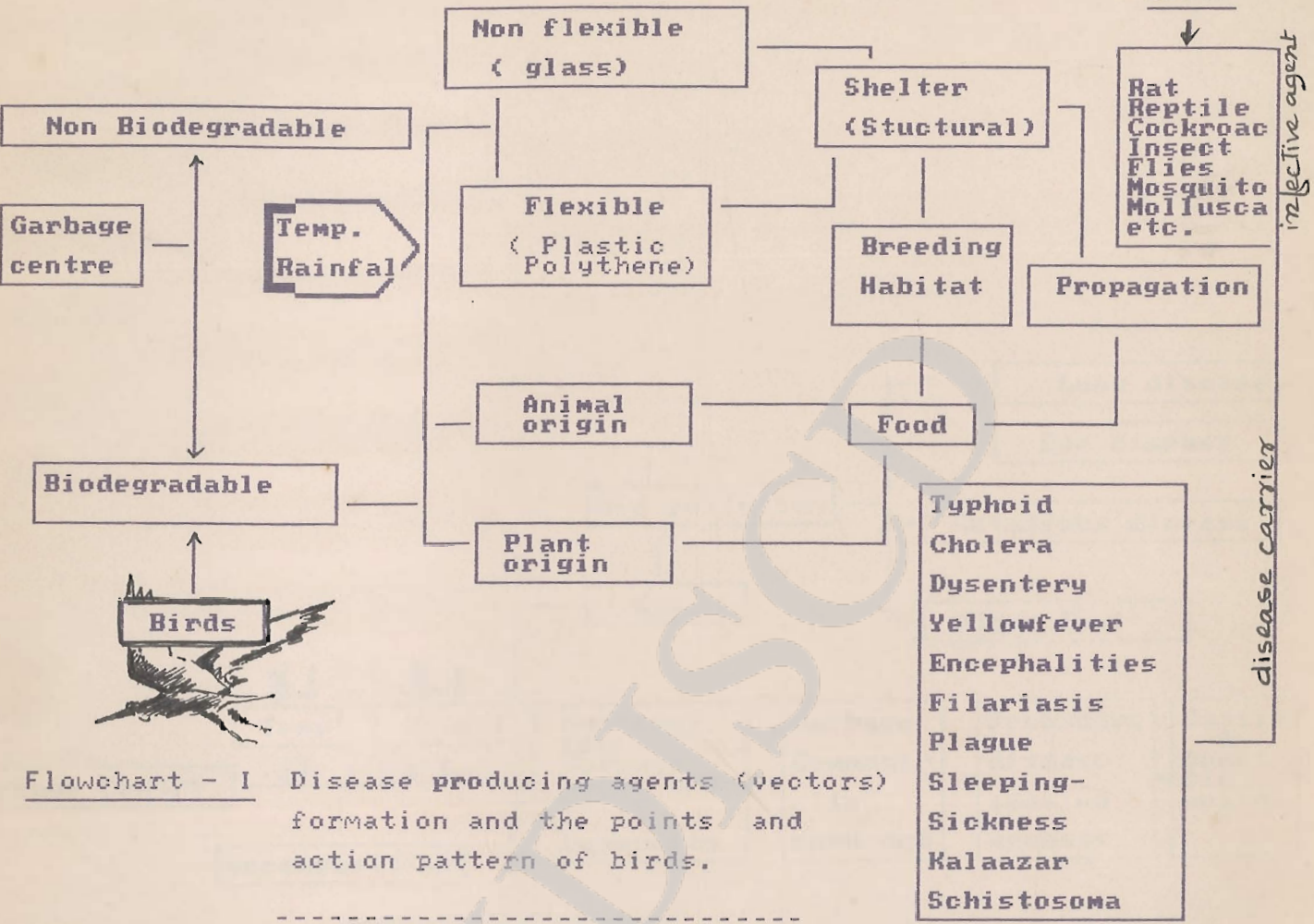
Table - water born diseases.

3.3.5. Air Pollution and diseases.

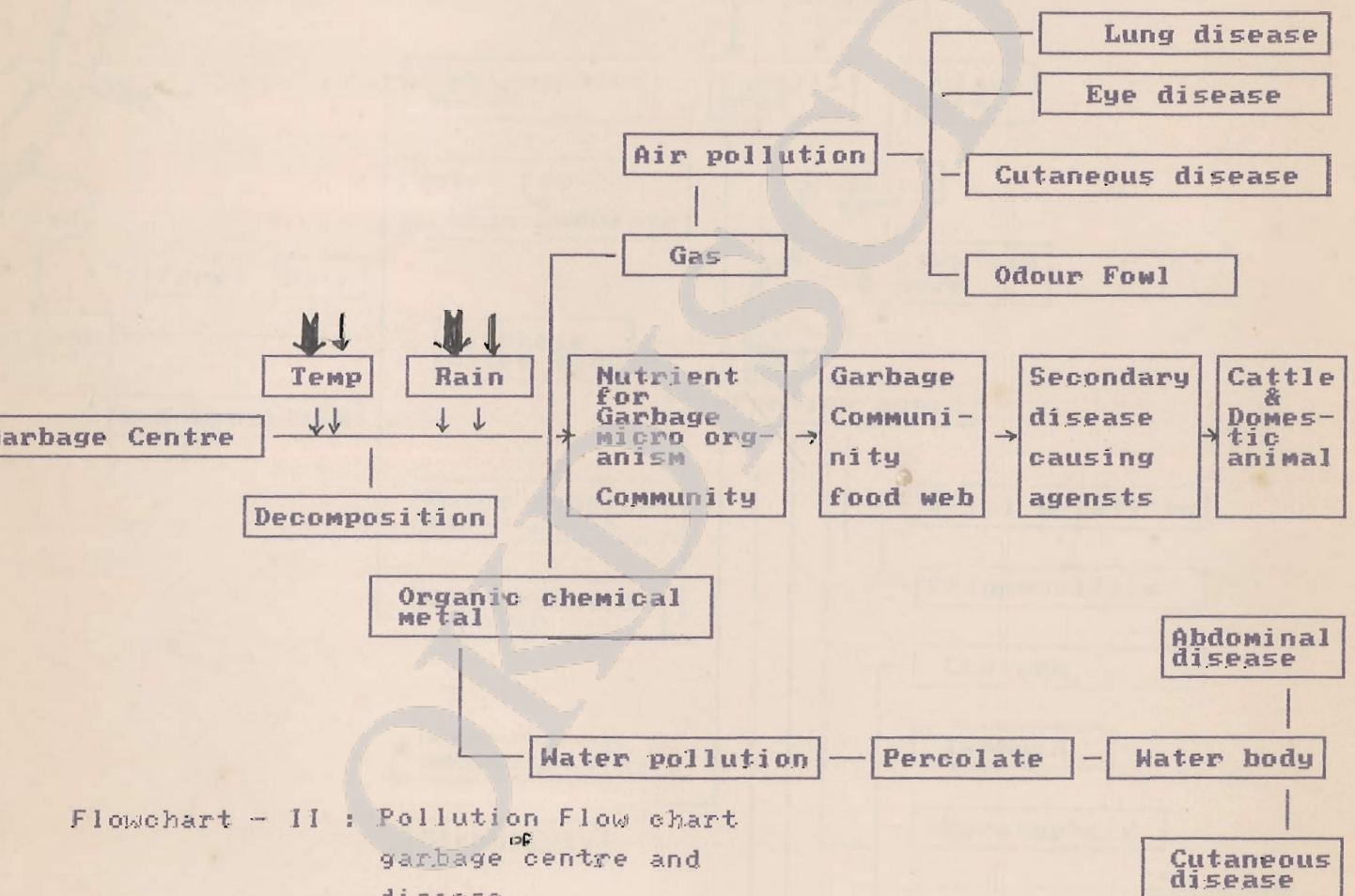
The gas is Produced by the biological decomposition of organic waste products from mans' activity and the deposition of

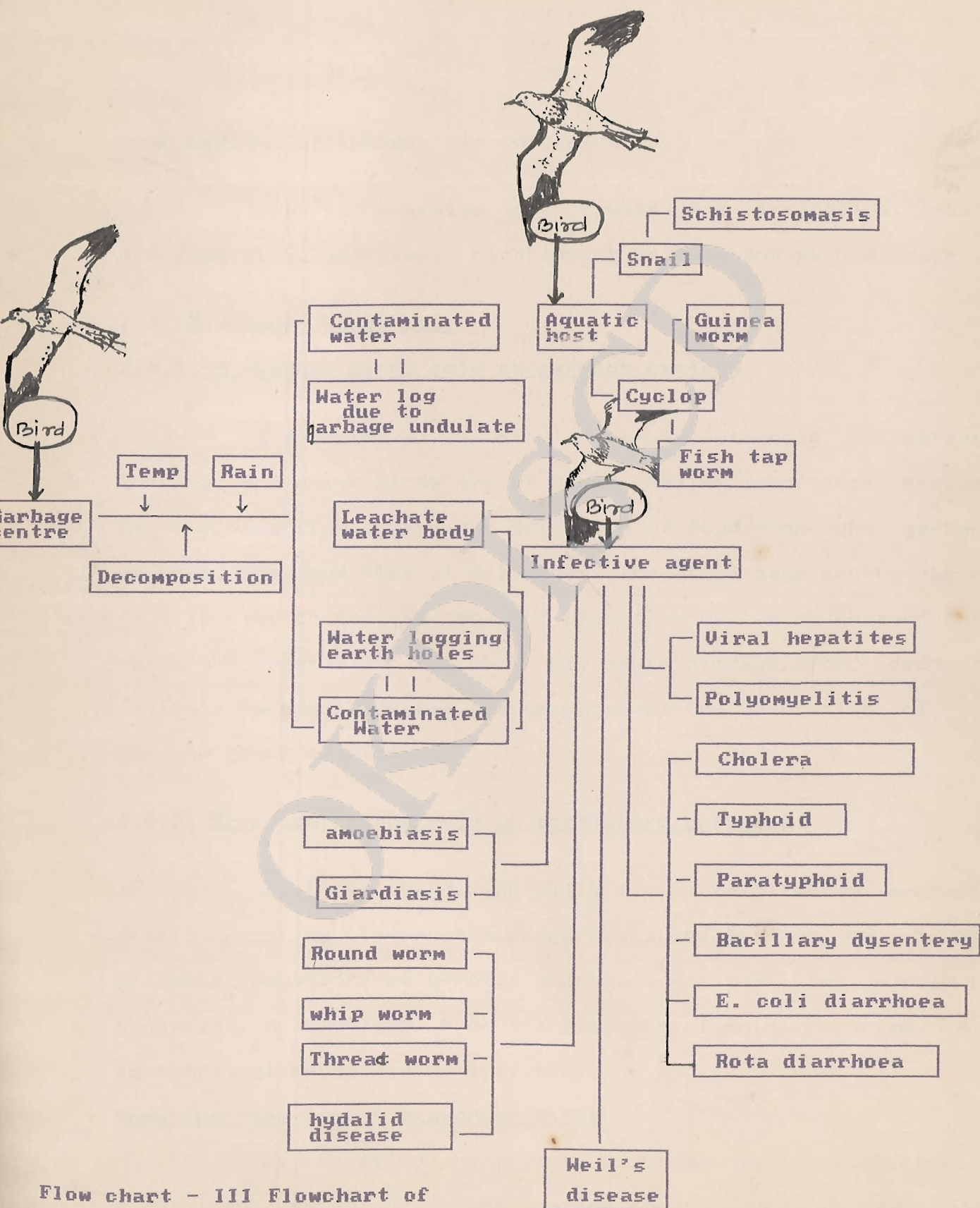


Birds



Flowchart - I Disease producing agents (vectors) formation and the points and action pattern of birds.





Flow chart - III Flowchart of waterborne disease.

dead bodies, ultimately air contaminated.

The contaminated air causes eye irritation, acute broncheolitis, emphysema, right heart failure and skin diseases.

3.4. Scavenger birds role

3.4.1. Scavenger birds role at garbage centres

Scavenger birds play an important role at garbage centres. Scavenger birds are of Public health importance because of the food item intake and selection of food from the garbage centres. The food item of scavenger bird at garbage centre varies from species to species. Some of them take carcasses, decayed carcasses and vegetable parts which may cause disease after decomposition. Garbage centres are the site of the generation of the diverse group of disease.

3.4.2. Scavenger birds role at scattered garbages

Scavenger bird specially minor facultative avifauna easily clearing the scattered garbages and leaving non biodegradable components of garbage which are not sufficient enough to generate the diseases. From the aesthetical point of view. The scattered garbages are of low value.

Roosting Behavior of Scavenger birds

The roosting behaviour of birds is a biologically significant behaviour. Some species roosts alone, in pairs of

small groups, also certain groups of birds roosts together and make a large communal roosting place. In Guwahati Municipal area different roosting place was observed as communal roosting. It has been observed that though many birds are found together at a place they may not roost together and may not show communal roosting behaviour.

✶ Trees associated with roosting

There are many trees in different roosting places of Guwahati Municipal Area. But it has been observed that roosting birds select some specific trees for roosting purpose. This may be due to height of the trees or may be due to better shelter. Some birds select large trees, some select bushy trees and some select only thorny shrubs.

It has been observed that, roosting birds select specific trees for the purpose of roosting which are distributed throughout the Guwahati Municipal Area. The Trees associated with roosting site are mainly as follows:

Sl. No.	Scientific Name	English Name	Local Name.
1.	<u>Ficus religiosa</u>	Peepal	Ahot
2.	<u>Ficus bengamina</u>	Peepal	Jari
3.	<u>Ficus bengalensis</u>	Banyan	Borgosh
4.	<u>Albizzia lebbek</u>	Siris Tree	Siris goch
5.	<u>Cassia fistula</u>	Indian laburnum	Sonaru
6.	<u>Acacia arabica</u>	Gum Tree	Babul (Tarua Kadam)
7.	<u>Pithecolobium saman</u>	Rain tree	Barakhun goch
8.	<u>Mangifera indica</u>	Mango Tree	Amgoch
9.	<u>Azadirachta indica</u>	Margosa	Neem
10.	<u>Tectona grandis</u>	Teak	Segun
11.	<u>Tamarindus indica</u>	Tamarind	Teteli
12.	<u>Nerium indicum</u>	Olender	Karabi
13.	<u>Phoenix sylvestris</u>	Date palm	Khejur
14.	<u>Delonise nigia</u>	Gold mohur	Radhachura
15.	<u>Minusops elengia</u>	India medlar	Bokul
16.	<u>Pinus Khasya</u>	Pine	Pine (Saral)
17.	<u>Lagerstroemia speciosa</u>	Jurul	Ajar

Table - Trees associated with roosting.

3.5 Other garbage animal community.

3.5.1 Animal community

In addition to the birds other animal community also scavenges the refuse in Guwahati, these are -

Cow, Goat, dog, jackel, horse and human.

3.5.2 Role of other community at garbage centre.

Cow, Goat, dog, jackel, horse plays an important role in scavenging.

All these animals eat food waste and market waste. They often transmit diseases. They maintain a direct contact between the human habitation area and garbage centre.

Human scavenger - A section of the poor people who reside in the slum areas mainly or often near the railway stations or on footpath. This section of the human population is not very high in Guwahati, but the children and women collect polythene bags or polythene cloth and send them for recirculation. They often collect the broken glass and iron scraps. It has also been seen that they collect some food items like half eaten meal, bread fruit etc.

4. Discussion

(i) On garbage :- Increased in the Urban population growth the generation of domestic and municipal wastes has increased during

the recent years. It is a common sight to find waste dumped in wayside, municipal drains, street corners and near the dustbin in a haphazard manner and even in market places in Guwahati. The putrescible heterogenous materials present in the garbage lead to the spoilage of the aesthetic beauty of the area concerned. The unscientific disposal of solid wastes begin to contact with air and water. Principal gases produced in decomposition are carbon di-oxide, methan and Hydrogen sulphide according to P.S. Rao. 1983. According to Mowli and subbayya, (1989) contaminated air causes disease to public health. The runoff during the rainy season causes the spread of these wastes whereas percolation of leachates cause water pollution according to shukla and srivastava, (1992) with the result that the entire acquifer system gets contaminated. The domestic and commercial wastes dumped in the roadside or public place cause public health problems by serving as breeding ground for vectors of diseases according to Mani and Misra.

The pattern of garbage generation in Guwahati is very peculiar. The majority of the nonbiodegradable components like the polythene, plastics and glasses donot go into the main garbage centres. These products go straight way into recirculation due to the collection of such materials either house to house or from the scattered garbage centres by orgained bottle and scrap collectors was interm sell that to the middle man for further

processing. The polythene carry bags and plastic papers also go for a recycling mechanism mainly by some very poor section of the society. The small scale unit of the polythene and plastic factories which are located under the Guwahati Municipal area donot get the main share of such scraps, but go outside the state also. The iron scrap are being crashed and being process in the local small scale steel factories.

The hard-boards and paper boxes and paper also go for recirculation in various form both inside and outside the state. These condition make the garbage generation in Guwahati mainly of organic nature- which are biodegradable. The lesser quantily of the non bioldegradable materials only helps in the creation of the microhabitation for vector to complete the life cycle. The creation of such garbage centres with very high organic load both of plant and animal origin has accelerate the importance of the scavenger birds in controlling the discese in term of generation and transmission.

4(ii). On scavenger bird:- The quantity of food eaten by scavenging birds is considerable . In the case of urban refuge, this quantity is a small proportion of the total available, but from a human pulic health point of view it is what they eat and at what quantity that matters, GAS, Vulture, Kite, Crow, Myna, Cattle egret concentrate on those waste materials which are most un wanted to man.

The population of scavenger bird varies species wise in different garbage centres. The population of scavenger bird counted at the special sites. In the special site crow attain the first position in numbers secondly, myna, third P.K. vultures in fourth position then cattle egret lastly GAS found in less number.

4(iii). Relationship between garbage centres and scavenger birds:- Scavenger birds existence itself indicate the station of the organic garbage generation of a place. The deveryity and the population of the scavenger bird are the indiction of quality and quantity of garbage generation of an area according to pumeroy.

The obligatory scavenger bird like vultures mainly feed on the carcasses and donot involve in the capturing of the live animals. Where as the greater adjuteant stork are europhagic having a very wide range of food preference. In the garbage centres when a dead cattles are thrown the few number of the sweeper community take off the skin of the animals with very great diet of efficiency. This practice help the obligatory scavenger to devour the carcasse in no time . Preventing the decay by bacterial action and hence the outbreak of the bacterial population and may be diseases. This inter relationship between the human and the scavenger bird is unique and extremely effective in desease prevention.

The facultative scavenger are dependent on the garbage

centres on the basis of the area of distribution and do not migrate long distance facultative large bird like greater adjutant stork; kite and occasionally crow have the tendency to select the garbage centre.

The facultative minor birds which feed on the large and permanent garbage centres are extremely localized populations which breed nearby and make a semi permanent settlement in the vicinity of such areas. The diversity of the food intake which are species specific, and the population of birds and the physiological requirement of the birds in different season, particularly the breeding seasons forced them to procure the essential materials for the food items available at the garbage centre.

It is to be noted that the roosting site, near the main garbage centres are one of the essential prerequisite at least for minor facultative bird species for efficient food intake throughout the year.

4.4. Gradation of scavenger bird:- A bird takes food a minimum 15% of its body weight. Food intake per day by the bird population of a specific species in a special site are different. We may grade the scavenger birds on the basis of their species population density and food intake capability in a special site. It is clear that the birds may be graded in various categories depending on their scavenging capability.

Species	Average Body wt. (Kg)	Population	Food intake per day (Kg)	Grade
Greater Adjutant Stork	7.8	135	158	IV
Vulture	3.5	1112	584	I
Crow	.60	4441	400	II
Kite	.60	1781	160	III
Cattle egret	.38	415	24	VI
Myna	.15	1981	45	V

Hence, the scavenging characteristics of the birds involve in the garbage cleaning can be graded as --

Vulture > Crow > Kite > Greater Adjutant Stork > Myna > Cattle egret

4.5 General Conclusion

It is clear now that a detailed and macrolevel analysis of the garbage production, source and distribution are essential for a future form method for the formation regarding the garbage disposal mechanism at Guwahati. The scavenger birds roosting site are, thus may a crucial role in the population buildup, which interm may inflict move positive role in disease control, is a situation where the population is increasing at a rapid place and simulteneously the civil animals of publice health are not generating.

4.6 Future angles in Study

1. The nesting seasons requires of the successful population build up of the scavenger bird.
2. The laboratory culture should be take up for the various form of diseases origin from the garbage centres.
3. The life cycle of the intermediate hosts - which are present in the garbage centre be done.
4. Inter relationship of the scavenger bird in a specific centre be studied in grant details.
5. Awareness amongst the people regarding the role of scavenger birds be assessed.

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