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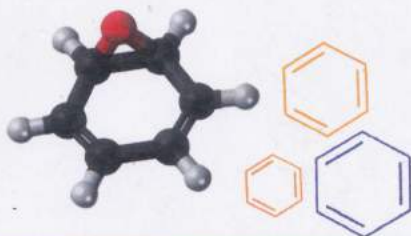
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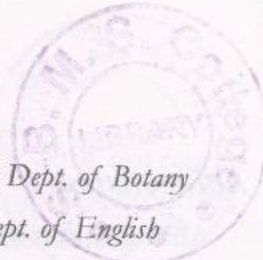
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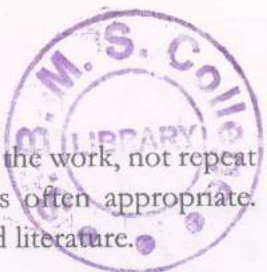
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Immediately after the abstract, provide a maximum of 6 keywords avoiding general and plural terms and multiple concepts (avoid, for example, 'and', 'of'). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible.



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THE DIVERSITY OF FAMILY SISORIDAE FROM NORTHEASTERN REGION OF INDIA

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Department of Zoology, SBMS College, Sualkuchi

Abstract

Fishes of Sisoridae family are available in the Asia region. They are bottom dwelling catfishes. This family has its greatest diversity in the Indian sub-continent. It is the largest most diverse group. Body whip like; adipose dorsal fin rudimentary, consisting of a small spine; upper caudal fin rays considerably elongate and filamentous, equal to about length to about length of the body; jaws and palate edentate. There are about 46 species found in the Northeastern region of India.

1. Introduction

Sisoridae is an exclusively Asian family of bottom-dwelling catfish most with more or less thickened leathery skins with specialized unculiferous tubercles on polygonal plaques (Roberts, 1989), typically inhabiting high gradient lowland or mountain streams, with adults ranging in size from 20mm to 2m. Many of the genera are disruptively or cryptically

coloured and have an adhesive organs (labial or thoracic) with they cling to the substrate. Sisoridae is largest and most diverse of the three families, containing 25 genera and approximately 120 species with new species being discovered frequently (Kottelat, 1983; Mo & chu, 1986; Ding *et al.*, 1991; Zhou & Chu, 1992). According to the availability of divided into two sub family Sisorinae. sub family Sisorinae The available genera are Bagarius, Sisor, Gagata, Gogangra, Nangra and sub family Glyptosterninae has genera Glyptothorax, Pseudecheneis, glyptosternoids and family Erethistidae has genera Conta, Pseudolaguvia, Hara, Erethistes (de Pinna, 1996). Out of 20 living genera 18 are found in the Indian subcontinent and 12 of those bearing species inhabit in the Brahmaputra basin. Sisorid fishes are induced by the rate of flow and dissolved oxygen content of water in the environment and it helps in the possible evolution of scissors fishes (Hora, 1930).

* Corresponding Author

During the early Pleistocene a major upheaval of the Himalayas had occurred and left the Palestine for deep. Along this for deep the early stock of *Sisor* must have spread westwards. It appears that *Sisor* could not tolerate the strains and stress of that period and fauna its habitat distributed every now and then by the frequent tectonic movements.

Results

In the present studies 46 species of Sisoridae have been studied. The species were collected and habitat type, food value and distribution are evaluated.

Materials and methods

Fishes were identified after Ferraris, 2007, Talwar and Jhingran, 1991 and further confirmed after Eschmeyer, 2006 and Fish base. org (2010). Taxonomy and distribution etc are followed from Goswami *et. al*, 2012.

Species	Habitat Types	Economic Importance	Distribution (within NE)	Status	Threats
<i>Bagarius bagarius</i>	R	Fd	A, Ap, Mn, Mg, Mz, Tr Sk	VU	NT, AT
<i>Bagarius yarrelli</i>	R	Fd	A, Ap, Mn, Ng	EN	NT, AT
<i>Exostoma barakensis</i>	R, Str	Or	A, Mn	LC	NT
<i>Exostoma bermorei</i>	R, Str	Or	Ap, Mn, Ng, Tr	LC	NT
<i>Exostoma labiatum</i>	R, Str	Or	Ap, Mn, Mg, Ng	LC	NT
<i>Exostoma stuarti</i>	R, Str	Or	Ap, Mn, Ng	LC	
<i>Exostoma vinciguerrae</i>	R, Str	Or	Mn, Ng	LC	NT
<i>Gagata cenia</i>	R, Str	Or	Wide	NT	AT
<i>Gagata gagata</i>	R, Str	Or	A, Tr	NT	AT
<i>Gagata gasawuyuh</i>	R, L, WI	Or	Mn	LC	AT
<i>Gagata sexualis</i>	R, L	Or	A, Mg, Mz	NT	NT, AT
<i>Glyptosternon maculatum</i>	R, Str	Or	A, Ap, Ng, Sk	LC	NT
<i>Glyptothorax annandalei</i>	Ap, R, Str	Or	Ap, Mn, Sk	LC	NT
<i>Glyptothorax botius</i>	R, Str	Or	A, Ap, Mn, Sk	LC	NT
<i>Glyptothorax saisii</i>	R, Str	Or	Ap, Ng	NT	NT
Species	Habitat Types	Economic Importance	Distribution (within NE)	Status	Threats
<i>Glyptothorax conirostris</i>	R, Str	Or	Ap, Mg, Mz, Sk, Tr	LC	NT
<i>Glyptothorax brevipinnis</i>	R, Str	Or	Ap	VU	NT
<i>Glyptothorax cavia</i>	R, Str	Or	Wide	EN	NT, AT
<i>Glyptothorax coheni</i>		Or	A, Ap, Ng	LC	NT
<i>Glyptothorax sinensis</i>	R, Str	Or	Ap, Mn, Mz, Ng, Sk	LC	NT
<i>Glyptothorax platypogonides</i>	R, Str	Or	A, Ap, Mn, Mz, Ng,	VU	NT, AT
<i>Glyptothorax chindwinica</i>	R, Str	Or	Mn	VU	NT
<i>Glyptothorax granulus</i>	R, Str	Or	Mn	LC	NT

Distribution (within NE)- A= Assam; Ap =Arunachal Pradesh; Mg= Meghalaya; Mn= Manipur; Mz= Mizoram; Ng= Nagaland; Sk= Sikkim; Tr= Tripura

Threats- AT= Anthropogenic threat; NT= Natural threat

Economic Importance- Fd= Food fish; Or= Ornamental fish

Habitat- P= pond; R= river; Str= Stream; B= beel; Bw= brackishwater; Fw= freshwater; Wl- Wetland, Pf- Paddy field present status EN- Endangered, VU- Vulnerable, NT- Near threatened, DD- Data- deficient, NE- Not evaluated)

Discussion

The present studies point out that there are 46 species of Sisoridae are reported from Northeastern states of India .Sisoridae is the second largest family of which most of the species belong to this northeastern states.

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SOME DYNAMICAL CHARACTERISTIC OF INVERTED VIRSION OF LOGISTI MAP

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Abstract :

We have established a topological conjugacy between inverted logistic map $F(x)=1-mx(1-x)$ and the quadratic map $Q(x)=x^2+c$, along with algebraic toll for determination of bifurcation points of the inverted logistic map and graphical ilustration with cob-web diagram and bifurcation diagram.

Key words:

Logistic map, Topological conjugacy, periodic bifurcation, Ceb-web diagram, Bifurcation diagram.

1.1.Introductin.

The Logistic map is define by $f(x)=mx(1-x)$, where m is the parameter. Again the map $f(x)= 1-mx(1-x)$ is known as inverted logistic map. For decades, several iterated functions have been extensively studied ,and rich contents bhave een explored .Logistic map is

one of the well-known maps and has become a standared map for studying iteration .This map contains all the interesting subjects in non-linear dynamics; .we list some references in [1-9].

In general, the values of x and m of logistic map are restricted in the range, $0 \leq x \leq 1$, $0 \leq m \leq 4$ so that each x in the interval $[0,1]$ is mapped onto the same interval $[0,1]$. It is known that there is a stable fixed point $x^*=0$ in the range $0 \leq m \leq 1$, and another stable fixed point $x^*=1-1/m$ in the range $1 \leq m \leq 3$. After that ,we have period-doubling bifurcation at $m=3, 3.4494897, 3.54409 \dots$. These numerical results are well known and are easy to reproduce on computer. However, it is a puzzle why we have two neighbour regions, $0 \leq x \leq 1$ and $1 \leq m \leq 3$, that each has a stable fixed point of f . According to sharkovsky ordering [1], the appearance of the order of periods should be $1 \rightarrow 2 \rightarrow 4 \rightarrow 8 \rightarrow \dots$, but instead we now have $1-$

$>1 \rightarrow 2 \rightarrow 4 \rightarrow 8 \rightarrow \dots$ This seems the Sharkovsky ordering is slightly violated. However it dose not.

1.2 Fixed Point

Let $f: X \rightarrow X$ be a diferentiable map where X is an interval on the real line. A point $x \in X$ is called a fixed point of X is $f(x^*) = x^*$ [2, 3]. In this paper, our mathematical model is $f(x) = 1 - mx(1-x)$ where $m \in [0,1]$ and $m \in (0,4]$. Clearly solution of $f(x) = x$ gives the fixed points of f . A fixed point x^* is said to be a (i) Stable fixed point or attractor if $|f'(x)| < 1$, (ii) Unstable fixed point or repeller if $|f'(x)| > 1$, (iii) Superattractiv of superstable If $f'(x) = 0$.

1.3 PeriodicPoint

Let us us suppose the notation f^n indicates the n-fold composition $f^n(x) = f \cdot f \cdot f \dots f(x)$ (n times)

A point x is called a periodic point of period n if $f^n(x) = x$ where n is a smallest positive integer.

From this definition we can easily say that the fixed points can be termed as periodic point of period one. In the similar manner, a periodic point of period n of a map f can be thought as the fixed point(s) of the n -th iteration of the map. [3,10]

1.3 Chaos

Generally there is no generally accepted definition of Chaos. From a practical point of view, chaos can be defined as bounded steady state behaviour that is not an equilibrium point, not periodic, and not quasi

periodic. The trajectories are, indeed bounded. They are not periodic and they do not have uniform distribution characteristic of quasi-periodic solutions. A noise like spectrum is a characteristic of chaotic systems. Another important fact about the chaotic systems is that the limit set for chaotic behaviour is not a simple geometrical object like circle or torous, but is related to fractals. [9] In short chaos can be defined as effectively unpredictable long time behaviour arising in a deterministic dynamical system because of sensitivity to the initial conditions. The key to long-term unpredictability is a property known as sensitivity to (or sensitive dependence on) initial conditions. Examples of such systems include the atmosphere, the solar system, plate tectonics, turbulent fluids, economic and population growth. For Devaney, chaos is seen as mixing of unpredictability and regular behaviors: a system is chaotic in the sense of Devaney if it is transitive, sensitive to initial conditions and has a dense set of periodic points. [3]

1.4 Topological conjugacy:

Defination: A map $f: X \rightarrow X$ is a homeomorphism if $f: X \rightarrow X$ is continuous and invertible and the invers $f^{-1}: X \rightarrow X$ is continuous.

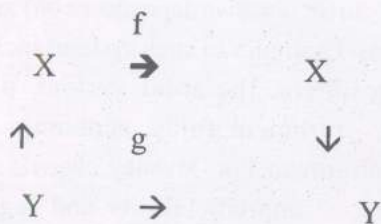
Dfination: Two topological dynamical systems $f: X \rightarrow X$ and $g: Y \rightarrow Y$ are Topologically conjugated if they are conjugated and the conjugacy map $h: Y \rightarrow X$ is a homeomorphism. We will call h a topological conjugacy.

Defination: Two topological dynamical systems $f: X \rightarrow X$ and $g: Y \rightarrow Y$ are topological semi

-conjugated if they are semi-conjugated and semi-conjugacy map $h: Y \rightarrow X$ is not only surjective but also continuous. We call h a topological semi-conjugacy. [3,6]

Let us define the topological conjugacy condition $g \circ h = f \circ h$ in the following figure. The idea is that both upper routes from the upper left X to the lower right Y -across the top, then down the right side, and down the left side, then across the bottom give the same result.

We say that the diagram commutes essentially, his mapping the function of to the function g .



Which shows $f \circ h = h \circ g$.

2. Our main result :

Topological conjugacy between inverted logistic map $f(x)=1-mx(1-x)$ and the quadratic map $Q(x)=x^2+c$.

The map f and Q are topologically conjugate if there exist a homomorphism h such that $f \circ h = h \circ Q$.

Let $h(x)=ax+b$, be a linear function where a and b are to be properly chosen.

We now try to solve $F(h(x))=h(Q(x))$ this gives $1-[-ma^2x^2+ma(1-2b)x+mb(1-b)]=ax^2+ac+b \Rightarrow 1+ma^2x^2-ma(1-2b)x-mb(1-b)=ax^2+ac+b$

Now equating the co-efficients of, which gives a system of equation involving $a, b,$ and $m. b=1/2$, as the co-efficient of x is 0.

Also $ma^2=a$ (co-efficient of x^2) $\Rightarrow a=1/m$

Again $1-mb(1-b)=ac+b \Rightarrow c=(2m-m^2)/4$

Hence the conjugacy between f and Q is given by $h(x)=1/2+x/m$

$$C = (2m-m^2)/4$$

Here $h(x)$ is a linear function, it is 1-1 so this is a topological conjugacy rather than a semi conjugacy.

3. Algebraic system for the bifurcation points of the inverted logistic map:

The determination of the bifurcation points of the inverted logistic map :

$$X_{n+1}=f(x_n)=1-mx_n(1-x_n), m \in (0,4]$$

Is specified by the following system of polynomial equations: $X_2=1-mx_1(1-x_1)$

$$\prod_{i=1}^n |1-mx_i(1-x_i)| = 1 \tag{1}$$

$$X_n=1-mx_{n-1}(1-x_{n-1})$$

$$x_1=1-mx_n(1-x_n), \text{together with the condition}$$

$$\prod_{i=1}^n m(2x_i-1) = 1, \text{ or } \prod_{i=1}^n m(2x_i-1) = -1 \tag{2}$$

Expressing the fact that the bifurcation point is the end point of the interval for m for which the period n solution is stable. Equation (2) can in turn be replaced by two equations:

Equations (1) together with one of equations (3) constitute a system of non-linear polynomial equation specifying fully the successive bifurcation points of the inverted logistic map.

4. Schwarzian Derivative

The Schwarzian derivative of a function $f(x)$ which is defined in the interval (a,b) having higher order derivatives is given by $S(f(x)) = (f'''(x)/f'(x)) - (3/2)(f''(x)/[f'(x)]^2)$.

This derivative was first formulated by H. A. Schwarzian and has been used in the theory of differential equation. It has found important application in study of bifurcation of periodic orbits, the Schwarzian derivative is used to study the limiting behavior of dynamical systems [9]. If f has a negative Schwarzian derivative on $[0,1]$, then it turns out that there must be a number c in $(0,1)$ such that $f'(c) = 0$, that is, f has a critical point. We say that f is S-Unimodal if its Schwarzian derivative is negative [14, 10, 11].

A surprise hidden in the above formula is that the Schwarzian is actually not a function. Informally speaking Schwarzian derivative is curvature. [13]

A sufficient condition for a function from interval to interval to behave chaotically is that its Schwarzian derivative is negative. [7] Here after calculating $f(x)$, $f'(x)$, $f''(x)$ we see $S(f(x)) = -3/m(2x-1)^2 < 0$ for all values of x

2.1 Bifurcation and Bifurcation Point.

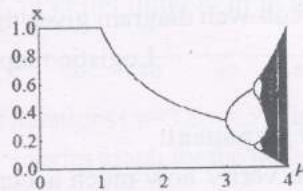
The word 'Bifurcation' literally means splitting into two parts. It is often desirable to know how the fixed points of a system change when a parameter of the system is changed. Normally a gradual variation of a parameter in the system corresponds to the gradual variation of the solutions of the problem. However, there exist a large number of problems for which the number of solutions changes abruptly and the solution manifold varies dramatically when a parameter

passes through some critical values (fixed values). This qualitative change in the structural behaviour of the system is called bifurcation, an originally French word introduced by Poincaré [1899], and these parameter values are called bifurcation values or bifurcation points $f_0(x) = -1$ indicates

bifurcation for unimodal map. [3, 10].

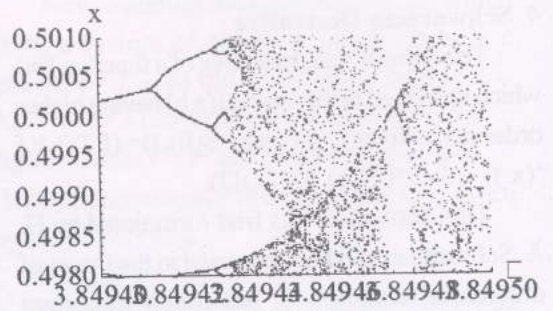
2.2. Bifurcation diagram:

Qualitative changes in the system dynamics is called bifurcations, and the parameter values at which they occur are called bifurcation points. In our study for the inverted logistic map $f(x) = 1 - mx(1-x)$, for the values of parameter m just below 3.0 the orbits converge to a stable fixed point. When the value of m exceeds 3.0, the fixed point becomes unstable, and the orbits converge to a stable period-2 orbit, which is created at $m=3.0$. Therefore, we say that $m=3.0$ is a bifurcation point of the map $f(x)$. The bifurcation occurs at $m=3.0$ is called period-doubling bifurcation, which is one of many types of bifurcations that can occur in dynamical systems.



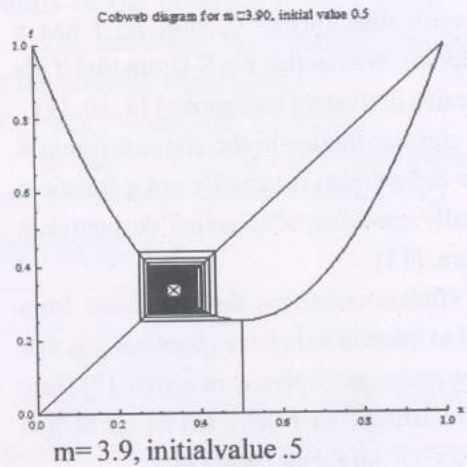
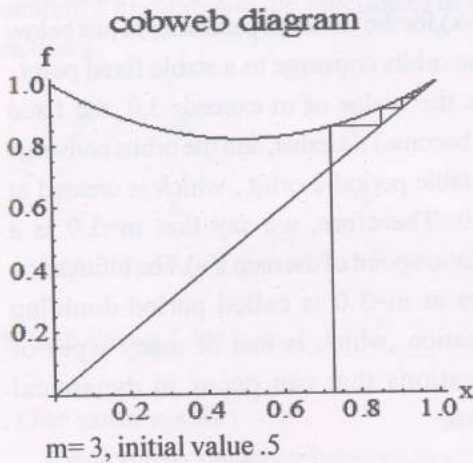
In order to study bifurcation in dynamical systems it is convenient to visualise the bifurcations that happen in different parameter values. We have realised that, even though it is possible to find bifurcation points using the plots of orbits or cobweb diagram, it is not the

most convenient and efficient way of identifying the bifurcation points. The reason is that with such plots we can only visualise the system behaviour at one parameter value at a time. A better way to see the general behaviour of the system at different parameter values is to plot the orbits as a function of the parameter. That is, we have plotted the orbit points x_n along the vertical axis against the values of parameter m along horizontal axis. Such a plot is called the bifurcation diagram. [2]



Bifurcation diagram for $3.84940 \leq m \leq 3.84950$.

2.3 Cob-web diagram of inverted Logistic map:



cob-web diagram gives the graphical representation of the Inverted Logistic map that how can attractor react.

3. Lyapunov Exponent:

In order to verify how much accurate is the accumulation point, the lyapunov exponent is calculated. Lyapunov exponent at the parameter greater than the accumulation point is found to be positive whereas lyapunov exponent less than the accumulation point is negative and at the accumulation point it should

be equal to zero. We begin by considering an attractor point x_0 and calculate the Lyapunov exponent, which is the average of the sum of logarithm of the derivative of the function at the iteration points. The formula may be summarized as follows:[2]

$$\text{Lyapunov exponent } (m) = (\log |f'(x_0)| + \log |f'(x_1)| + \log |f'(x_2)| + \log |f'(x_3)| + \dots + \log |f'(x_n)|)$$

From graph of Lyapunov exponent, we see that some portion lie in the negative side of the parameter axis indicating regular behavior (periodic orbits) and the portion lie on the positive side of the parameter axis confirm us about the existence of chaos for our model.[2]

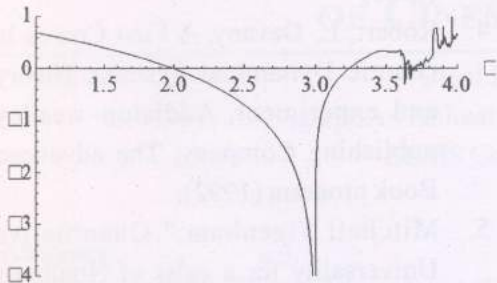


Figure:3.1 Lyapunov exponent of the map. Negative values indicate periodic. All most zero values indicate bifurcation points and positive values indicate chaos.

4. Time Series Analysis: [3,10]

The key theoretical tool used for quantifying chaotic behavior is the notion of a time-series of data for the system. By observing data over a period of time, one can easily understand what changes have taken place in the past. Such an analysis is extremely helpful in predicting the future dynamical behaviour. [2,4]

We open our journey with a couple of very simple time series experiments. On the horizontal axis, the number of iterations (time) is marked, while on the vertical axis the amplitudes (ranging from 1 to 4) are given for each iteration. Figure 4.1 shows the computed time series of x -values starting at $x=.5$ with the parameter value at $m=3.$, the points are connected by line segments. Time series

graph is non-sensitive, stable behaviour and leads to the same final state of a single fixed point.

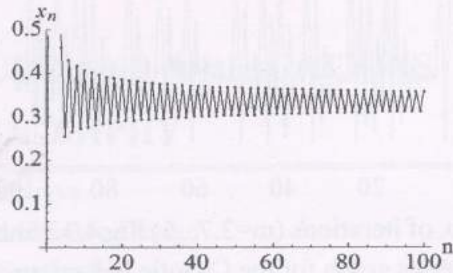
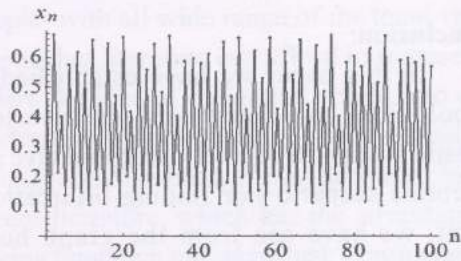


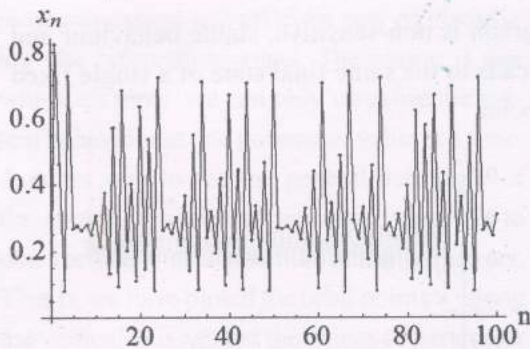
Fig4.1: Time series graph for period 2

Now, let us look at the second time series in fig 4.2, which is based on the same formula and the initial value of $x=.5$ with the parameter value $m= 3.6$. We notice periodicity and oscillate between two fixed points with the same amplitude, and the cycle repeats.



No of iterations ($m=3.6,x=.5$) Fig 4.2: Time series graph for the period4

The third time series in fig 4.3, which is based on the same formula and the initial value of $x=.5$ with the parameter value $m=3.7$. We notice periodicity and oscillate between four fixed points with the same amplitude, and the cycle repeats.



No. of iterations ($m=3.7, .5$) Fig 4.3 Time series graph for the Chaotic behaviour

But, if we start with the same initial value of x and the parameter value $m=3.7$, the picture shows an irregular pattern which is difficult to predict meaning thereby the appearance of the chaotic region, Fig 4.3. Thus, the time series analysis also helps us for full description of bifurcations and chaos for the concerned model.

Conclusion:

In this paper we have established a Topological conjugacy between inverted logistic map and a quadratic map and give an algebraic scenario For finding bifurcation point. we have see from the graph how Lyapunov Exponent changes its sign from negative to positive as the control parameter very. This negative value indicats about regular behaviour of the periodic points and positive value gives the sign of chaos.

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AESTHETICS OF LITERATURE AND OBLIGATIONS OF CINEMATOGRAPHY

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Abstract:

“Tagore [Rabindranath Tagore] was able to create a suspension of disbelief amongst his readers even when he described this series of events [referring to cycle of events in Tagore’s novella “*Nastanirh*”], partly by taking advantages available naturally to writer of literature, and partly through his own eloquent language. No filmmaker could possibly achieve what Tagore did.”¹

- Satyajit Ray

Linguistic expression of literature has no palpable limit as the psychological realm of audience is infinite. The author can make the reader laugh, cry; sympathize with the lucid narrative of his writing. Readers construe these chronicles of events in some way or other in connotation with memory and other subliminal experience. They imagine them instinctively in relation to their own experiences and commiserate with archetypal rendering of emotion, poetry, realism and humanitarian qualities. Every moving image has its own

implication until it’s juxtaposed or interwoven to elicit some other abstraction or dialectical implication. The lyrical quality of literal narratives can be attempted to adapt into cinema by means of carefully imprinted stream of image and sound. But it may be argued that to what extent can cinematography objectively narrativize literary portrayal is a debatable topic- with all wide range of the tonal variations that literature can afford to represent. Here the idea of obligation comes into consideration. Cinematography is saddled with the obligation of imbuing the subtlety into cinema from literature, which has the advantage of being figurative and subtextual. Considerations for choosing creative tools, lensing, lighting, camera movement and rhythm become very crucial when it comes to concretize the characters, plots, milieu and motifs instilled in literature. Even the contrapuntal coordinates of time and space have brought cinematographic compulsions to new high as everything in literature can’t be interpreted in a singular progression keeping in mind the layered experi-

ence it etch out in the reader's mind. Cinematographer, as the creator has the freedom to choose from sharply intrusive or delicately choreographed shot with subjective or objective perspectives to render abiding impressions. This paper wants to discuss various consider-

ations, implications, limitations of cinematography and its intricate relationship with the pictorial analogue of the source literature vis-à-vis various coherent theories and practices intrinsic to both the art forms.

Keywords: Literature, cinematography, narrative, psychology, adaptation, aesthetics

1. excerpt from Satyajit Ray's article '*Charulata Prosonge*', published in Parichay, 1964

SEMIOTICS IN THE AESTHETICS OF LITERARY NARRATIVES

"Literal translations are not the faithful ones.....

A character on the screen and the same character as evoked by the novelist are not identical."

-- André Bazin (the Leading Light of the French New Wave)
in his essay "What is Cinema? Vol. 1

The appreciation of aesthetics of literary narratives is very subjective. It depends on the imaginative faculty, sensory perception and a complex neuro-chemical process that facilitate the formation of photographic memory. This neuro-chemical process helps in association of the textual content to the imagistic milieu that the reader unconsciously constructs upon reading the narrative text. Now this 'association' has primordial influence in understanding the human psychology that gives birth to these images. Every human being is born and brought up in certain conditions, geography, environment that is cardinal in shaping his or her mental world.

The environment may be outer and inner. The outer environment which is perceptible and materialistic in nature, influence formation of inner which in turn has an effect in pictorial sense of the person. Since these environmental and geographic elements are unique, the mental milieu has also some unique contour that has been shaped by memories, experiences surfaced out of encountering scripted events that varies in individual case. Moreover, literary narrative is sort of a guided process in the sense that the delineation of mental word, feeling and its resultant texture are done through words that the author compose. So the reader has to

assimilate with the world molded by the author via spinning a yarn of imagery. In spite of its substantial advantage as a mode of artistic expression, one feebleness that literature is saturated with is the tendency to explore less aural context in narrative than its visual analogue. Due to its immense power to imbue emblematic and graphical image, the immediate focus of the literary narratives have been to induce the reader to a realm of magical presence from where he can commiserate with world of the characters.

The *Naad-Brahma* proposition which got its mention in the ancient holy scripts, suggests that "The whole universe is sound." A sound has the ability to create an image relating to its source, or the image that has a deep bond in our mind about that sound. This synesthetic attribute of sound has added a layer in visual design of narrative. But an image alone can't generate the sound apropos to its content. Thus, aesthetically pleasing ideogram of literary narrative may not always evoke the aural coordinates. When we open our eyes, we enter a world, when we close; the world enters us. Speed of sound is slower than that of light- that is why it is more precise. Story narrative is developed with the paraphernalia associated with memory. It is to be observed that how discrete, disjointed images from memory can be interspersed to write a narrative in story form. These paraphernalia are so common in our life that we always have some memory associated with it. The memory give rise to thought which is endless, disconnected and does not occur in loop. We always get something new when

we delve into our memories- finding a structure in it, which enables us to see the world through our own perspective.

Cinematographic Verisimilitude:

Camera was invented as a device for imprinting realism, synthesized optically by a lens and storage device [film]. A photographic image bears a sense of eternal tranquility free from the spacio-temporal logic of all the human memory and associations. As the image making device camera used to be huge with all its assorted paraphernalia that it affected the very 'being' of the people it photographed with an apparent premonition of agility and invasiveness in the way it is placed before the object. The organic contribution of the photographer in the process of photography is composition of the frame, controlling light and focus. The mechanism of focus is analogous to the Selective Vision method of human image perception. With the development in zoom lens, there is manifold growth in image magnification and thereby greater instances of insidious surveillance and subsequent recording. Again, considerations have to come about the human intervention of the photographer in terms of adjusting the light (temperature) as well as the position of the model-the whole artificiality of the process develops pessimistic enthalpy. These repetitive corrective measures in terms of pose, altering lighting and backdrop parameters drain out energy of the model and a docility embalms his/her persona. Interestingly in this process of creation of the image, organic contribution

is very meager. Although much control has been transferred to the hands of the photographer in the pre-capturing/imprinting time, his intervention once the shutter closes is negligible. Many critic, theorist were repelled by this unbalanced symbiosis of organic and mechanical practice. But in case of Motion Pictures where images move at certain speed to demystify the verity between illusion and reality, some more factual coordinate has to accommodate.

The masters of the art form have conceived cinematography to be more than just mere reproduction of reality in motion. Robert Bresson has stated that "cinematography is a writing with images in movement and with sounds"[#]

The graphic verisimilitude of cinematography has generated excitement and apprehension among the mass. The ephemeral destiny of life was conferred the persistency with reconstruction and reproduction of moving images over and over again. Andrea Malraux opined 'cinema as the furthestmost evolution to date of plastic realism'

[#]Notes on Cinematography, Robert Bresson etc.

But on the contrary, the development of image magnification system -optical and recently digital has elevated the baroque quality of images; extra bit of detail in sharp focus, pixel enhancement imaging done with the help of macro lens that would go unnoticed with bare eye. They have brought a milieu unknown to history photography before. Similar innovation in the image hardware (processor)

and sensor such as the ever increasing frames-per-second perimeter, higher ISO that has raised the quality of detail in *découpage* of the character, set, background etc. This has marked three way influence on the art of Cinematography. Primarily, it has deconstructed the mythical sense of images where we don't see everything in the frame with identical precision- and the insertion of detail has bridged an epidermal curiosity for the *découpage* in the mind on the audience which may drift his engagement with the narrative as whole. He will expect surface embellishment in the images of object rather than looking for inner life of the shot. This is not at par with the mechanism of human vision. Because of this violation it has caught our attention at recent times- and in quest of probing reality by recreating more realism with detail in epidermal textures, we have caught victim of a pseudo realism in a very vicarious way; giving more attention to aesthetics of graphical composition than the inner being of the still or motion pictures. Thus we are again falling for the appeal of medieval western paintings where elaborate style has symbolized the realism of the photographed images evolved much later. The enormous control in the hands of the photographer allowed him to play with tonal variation of light and shade- thus creating an illusion of reality. This sense of illusion was different in the works prominent film makers like Federico Fellini, Satyajit Ray, Robert Bresson. There is mythical and dialectical layering in their cinema which is synonymous with the very unique feature of

literary narrative- unraveling the plot as we read further. Although film narrative is not a linear one, these filmmakers have been able to create an apparent sense of linearity identical to their source of literary lineage. Also the exposition of scenario via lensing was contrived in their films as it happens in textual elucidation of literature in which gradual unraveling of the plot happen more spontaneously.

Secondly, with this precision and graphical detail, the artificiality in set construction is more noticeable for which art directors now are compelled to put extra effort so that the set and all the paraphernalia associated with it does look real and seamless. Oftentimes, this has led to the evolution of Computer Generated Imagery (CGI) and visual effects cinematography to a distinctive arena to accomplish intricate and highly imaginative visuals. However, there remains an apprehension that this may drift the energy level of filmmaker to some area which is not pivotal to the core of making the film.

Finally, the way non-fiction and cinema verity shot and their objectivity has changed with the advent of modern developments in cinematography is worth mentioning. The form cinema verity strives to emulate authenticity and naturalness of action, people in everyday situations without creative control. But in the quest of recreating past events or fictional accounts, a new genre has cropped up, loosely called mockumentary imbibing formalistic approach to imagemaking.

Jean-Luc Godard was concerned about imagistic dominion of human touch over the synthetic process. He was also approved of the view that a "A film is not a lifeless, flawless object made by a machine; it is made by man, so there is nothing wrong if it carries the evidence of the work a man has done with his own hands, and that should not stand in the way of a just artistic evaluation"

Creative merit of a cinematographic image

"Adaptation doesn't necessarily destruct a novel because cinematography also uses a narrative, a visual form of narrative"

- Thomas Mann

There are instances where profound emotion is evoked by cinematography alone. In the words of Satyajit Ray,

'In his [referring to film director Dovzhenko] film *Earth*, Vassilli, a farmer's son is killed as a result of a kulak conspiracy. Other farmers arrive to carry his body away for its burial. They have to pass through an apple orchard. A close-up shows the dead Vassili's cheek being gently brushed by a ripe apple, hanging low. The feeling in that single image evokes cannot be described in words- it is possible to express it only through the language of cinema.'#

One thing that cinema has revolutionized is that it is able to create a rhythmic movement of its narrative which is similar to the intricate thought process of human mind. This non-linearity is accomplished via juxtaposition of

images, shooting mis-en-scene, sound design, editing devices such as montage, cutaways well as Computer Generated Imagery (CGI) and animation for creating an illusory realm. Human thought process is endless and seamless. Any thought/image redolent with memory can resurface in our mind when it is able to form an association with present occupation of mind. Such accession of inner world is comparatively difficult to infuse in literature as a conscious endeavor on the part of the writer. However, a writer can bring his sophistication in his work by repleting his writing with subtext, metaphor and other literary tropes. Poetic technique such as ideogrammic method may serve as a passage between infinite narrative potential of literature and confined scope of visualizing intricate text with cinematography.

Colour : Colour imparts the projected image with a vibrant outlook that serves two purposes 1) creating a larger than life image 2) sense of closeness to reality.

The practice of shooting in colour has propelled the notion that a particular colour in a visual segment can emote certain mood which is deep-seated in our consciousness. The study of colour and its functional and behavioral influence on the viewer has been done in a period earlier than the birth of cinema. Painters and colour theorists have been doing it for centuries. Initially shooting in colour was the primary engagement of the filmmakers/producers without giving deep thought. Though human vision perceives things as a whole, certain compositional arrangement,

selection of certain colour combination has functional role in evoking feeling associated with certain mood. Painters and artists have explored this aspect in their work. But in camera everything is captured homogenously which gave it a feel of banality of everyday life. Gradually cinematographers too, started giving thought to arrangement/selection of colour themes in their work. Creation of Digital Intermediate(DI) from the film in lab then processing it to make necessary 'Colour Correction' serve to enhance the graphical quality of the film. Cinematographers and art-directors collaborate to design a colour theme that will perfectly depict the subliminal disposition of the script. In this process, cinematographers often consult the works of masters like Rembrandt, Van Gogh to direct viewer's attention to a particular spatial coordinate inside the compositional enclosure synthesized by camera and refer to colour scheme. Closely observing the light and colour of master painter's work would enable us to get overview about compositional prospects.

Depending on this magical quality of light and colour, ace cinematographers/directors were able to manipulate audience engagement on the screen. But serious filmmakers of last century were not convinced about using colour in their work. Satyajit Ray himself kept making films in black and white even though colour stock arrived in India much earlier due to aesthetical as well as economic grounds.

Hollywood filmmaker Steven Spielberg choose to use black and white over colour in

his film "*Schindler's List*" primarily because it will create a sense of timelessness. Someone watching the film a century after wouldn't have the idea when the film was made. Also he used documentary inspired hand-held camera to impart greater sense of realism into it. Since colour captures the mood, fashion, style and zeitgeist true to an era; black and white will free us from all these information thereby creating the desired impact the director is looking for. The sparse and careful use of colour in "*Schindler's List*" has saturated the grimly morose theme of the film with a quest of liberty which the characters are longing for.

"In this quintessential tribute to the human spirit, the use of transparent red for the little girl's coat layers our experience of the story. The red gives her a visual name and allows us to have a living being to cling to in this mass of nameless dehumanized near ghosts. The child runs. She plays. She hides in this perverse metaphor for hide and seek. The gentleness of the transparency of that red coat is exactly what makes the metaphor profound. Somehow we know it was once brighter, and the transparency is what tells us that. Her coat is not pink, the color of little girls. It is red, robbed of its power."

Obligations and possibilities within cinematography:

As common parlance, camerawork of a film has to be homogeneously discernible to a certain extent in form so that mass audience can interpret the content. But cinematography has its own constraints and has to take into account of physical aspects such as movement, lighting, texture, narrative flow and dynamics apart from inherent behavioral manifestation of the people it portrays. In this context, Andrei Tarkovsky has stated that

'Nothing in cinema at the present time is more neglected or superficial than psychology. I'm talking about understanding and revealing the underlying truth of characters' states of mind; this is largely ignored.'

Considering the illustrative nature of moving images, it seems that we can almost transform any literary narrative into cinema. We can achieve this graphically by following the approximate sense of the words then impeccably reconstructing it with actor, props and camera. The narrative thus thrives inside an altered format, moves closer to the perceived notion of meaning of the words as construed by the cinematographer/ director. Thomas Leitch pointed out ".....another factor influencing the presentation of the narrative is its performance by the actors who, subject to varying degrees of directorial control, serve as intermediaries translating a written script for public reception." He also noted "The script is a performance text—a text that

requires interpretation first by its performers and then by its audience for completion—whereas a literary text requires only interpretation by its readers.”

Filmmakers have often overlooked the psychology of the original text and the slightest hint that may carry by the way of its setting, the environment, and disquieting mindset of characters. As the psychological portrayal is directly associated with acting or emulation, it is important for the director to articulate the truth about the emotional bent of mind of character to the actor. Directors like Ingmar Bergman, Luis Bunuel, and Federico Fellini have dealt the subject of psychology with remarkable individual depth totally different from each other.

There are reasons for overlooking the intricate human psychology resulting in interweaved drama and conflict among the characters. The intricacy to visualize subliminal realm doesn't end here, even other complex elements are added to films day by day. Technological developments in certain market driven part of the world where film is proposed as a primary medium of entertainment, pushed to integrate some supernatural content in the name of creating hyper reality. These supernatural contents are orchestrated by amalgamation of Visual Effects and Computer Generated Imagery. Focus has shifted to depict certain somatic realism with extravagant details, uncalled-for human perception. Film production has transformed into a grander practice and concept of star system, cinema halls, promotion and marketing arise which

changed the art of cinema. Moreover the embodiment of abstraction in other art forms such as painting, theatre is taken for granted by the audience. But popular or commercial cinema, as the conventional sense of the term implies, being an art form which is inclined towards actuality, cannot accommodate abstraction and psychological accounts which is aimed at multitude of audience with varying intelligence level. Often people don't connect to the somatic embodiment of cryptic code of psychology on screen, the experience of which varies from person to person depending on individual upbringing, memories and environment. By virtue of the visuality of cinema audience experience everything in concrete terms subjectively free from connotative abstraction of literature.

“I was glad to see signs of a watershed forming between cinema and literature, which both exercise such a strong and beneficial influence on each other. As it develops, the cinema will, I think, move further away not only from literature but also from other adjacent art forms, and thus become more and more autonomous.”

— **Andrei Tarkovsky**

These lines from Tarkovsky aptly describe the conceived fate of literature and cinema. He carefully noted the passage from literature to cinema and referred to it as “watershed”. He further argued that “Cinema may take dialogue from literature, but that is

all—it bears no essential relation to literature whatsoever. A play becomes part of literature, because the ideas and characters expressed in dialogue constitute its essence: and dialogue is always literary. But in cinema dialogue is merely one of the components of the material fabric of the film. Anything in the scenario that has aspirations to literature, to prose, must as a matter of principle be consistently assimilated and adapted in the course of making the film. The literary element in a film is *smelted*; it ceases to be literature once the film has been made.” [Sculpting in Time, P 67]

In recent times, the study of psychology has branched out to newer domains and this will surely encompass psychoanalytical elements in films. It can be hoped that such extensive studies will help in enhanced appreciation and thereby leading to production of sophisticated psychological content in films.

Undercurrent plot device such as McGuffin in films help to impart an inner movement shadowing the clichéd narrative constituents, thereby creating a sense of spontaneity in the chronicle of events. McGuffin is an object or possession that central characters pursue but is not deeply connected to the plot or mostly devoid of logical sense. Likewise, circumstantial simplification of plot in film narrative due to cinematographic compulsions may give rise to some unknown visual attributes which in turn impart a new dimension. Depth of field, lighting, colour, pacing, rhythm and movement, assembly of match cut bestow the narrative

with an ‘educated’ meaning— allegorical in sense.

Visual Chimera: simulation of illusion in dealing time stretch

Time can be compressed/stretched in films. The narrative time within the temporal setting as extracted by editing is expected to be proportional to actual timeline of events. When time is referred in film analysis, the feeling of time is taken into consideration. The action in motion seems to happen in realtime when reproduced again. But if we probe into the method of reproduction— what kind of a reproduction/revitalization/resurrection can allow us screen our end product that is reproduced in realtime again and again? Does not the reproduction drain out its energy to change its pacing?

The sense of timing in each shot can be determined by 1) cinematographic elements -higher/lower frames per second (fps) rate set at the time of shooting 2) movement in space and time 3) editing that can reconstruct a new sense of time out of the shot material hampering their individual time 4) technical consideration at the time of projection-whether fps rate (in film as projection material and working condition of film projector) and broadcasting format (projection of Digital Video) are in sync with previous settings while shooting.

Classic case of dealing time: flashforward through cinematography

From the film - ‘*An Occurrence at Owl Creek Bridge*’: as the convicted (protagonist) is hanged, he dives into water-unties himself

and struggles for survival. His desire to escape the sentence and meet his wife forms a cryptic dealing with time in the narrative in the French short film "*La Rivière du hibou*" adapted from the short story '*An Occurrence at Owl Creek Bridge*' written by Ambrose Bierce. Don A. Habibi terms this narrative as "the liminal, distended time flashforward." He further says that, ".....The extreme threshold of life-or-death situations is the stuff of great drama, and is thus a mainstay in literature. So is the idea of the hero gaining acute physical, mental, or spiritual powers in the face of grave danger. Framing a story within a flashback is also a common narrative technique. Less common is the "flashforward," although it has been utilized since ancient times in such forms as prophetic, symbolic dreams, mystical visions, or fantasies of the future..... However, the framework of the flashforward, combined with the near-death consciousness of a condemned man who seems to evade death in expanded subjective time, is a relatively recent narrative combination. As far as I have been able to ascertain, the technique is a Biercean original."

This technique has been used by many renowned writers after Bierce. Habibi also finds the pictorial analogue of the literary narrative in the film adaptation precise as fence between the sense and perception disappears, "The technique also succeeds on film, because the moving image captures and expresses the descriptive details of the narrative more immediately than the written word. The motion picture allows us to

experience the perceptions of the protagonist more viscerally. Furthermore, film is better suited for conveying the manipulation of time." "THE MAGIC MOMENT": Don A Habibi , The ABP Journal Fall 2005, Vol. 1 No. 1.

Conclusion:

There is certain difference in approach between a writer and a cinematographer in the very way they handle their resources to elaborate their imagination and/or stimulate visual faculties to create their individual expression. But at the same time there is semiotic analogy between them in the sense that they are the couturier of their arts, presenting it by following the aesthetics they conceive. Each of the creative process draws its inspiration from people, events, social observation, experience [filtered to the cinematographer if he has to empathize with someone else's work; he will cast his personal influence in turn] the creators encounter in their day to day life. One may apparently try to translate verbal codes of novel to visual narrative very 'faithfully', sentence by sentence; yet he may not bring much to the screen. This sounds interesting and narrates the different orientation these two art forms exhibit. The obscured layering punctuated by plot points throughout the total body of literary fabric imparts a breathing space which we almost effortlessly assimilate into. But upon close analysis of the functional aspect of various literary 'figure of speech', one may observe that they impregnate the narrative with an elevated feeling that heightens the

aesthetic perception despite its seemingly simple and linear story. Again in cinema, the image enhancement devices (during shooting and post production) will subliminally induce an allied impact of visual schemes and fresh perception to match the veiled narrativization of the original text. I am not sure whether it is appropriate or not to draw a parallel between the two art forms, but I believe there is scope of studying the blurring line in terms of treatment and representational values. Additionally, this paper seeks to perceive what happens when we try to capture some images that have been etched into our mental canvas due to flickering of concurrent thoughts stemmed from reading the source text. Besides, it would not be proper to study analogues in both art forms in contrasting terms since their expression does not always happen within the norms of codified praxis. At the very basic level, we can conclude that literature saturate our discernible logic with seamless or fragmented imagery. Cinematography is the device or tool to resurrect those array of imagery realized through imaginative aptitude of the visualiser/cinematographer. The imagery thus formed can take any form, contour, hue or texture to fill the void of creative possibilities. Cinematography has to achieve the image within the palpable constraint of resource, talent conforming to the very motive of recreating that image. In this process of transmutation both the art form have to retain something

innate to it while absorbing selected benign element from the other. This symbiosis will help both the art go a long way.

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THE EFFECTS OF NOISE ON STUDENTS AT SCHOOL: A REVIEW

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ABSTRACT:

This paper reviews on issues relating to the effects of noise on children at school. Specially, the effects of environmental and classroom noise on children's academic performance, children's annoyance due to noise and surveys of classroom noise levels. Consistencies and discrepancies between due results of various studies are highlighted.

1. INTRUCTION:

In the past 30 years, there has been a great deal of research into the effects of noise on children's learning and performance at school. Noise, defined as unwanted sound has a major effect in the school classroom. Exposure to high noise levels are very well known to have harmful effects on health and well-being of human beings. Noise is a well known source of pollution in urban and work environments. Different studies in different time indicates that noise pollution around the

educational institutes produces multi problems to the teaching learning process and negatively affects the performance of both teachers and students. The noise level should be in the range of 40 db to 50 db in and around an educational institute [3, 4]. But it exceeds in all cases. It has been seen that questionnaires also help in determining the effect of sound in educational institution. Different Questionnaires should prepared for students, teachers and officials [13, 14].

The noise in a classroom is made up of external noise which is transmitted through the building envelope, plus internally generated noise, so that children in school may be exposed to noise from a wide variety of sources. The main source of noise is due to transport system, industrial noise, and noise of people outside the school. An additional source of noise which cause significant disturbance to teaching is the noise of rain falling on light weight school roofs [19, 20].

The predominant external noise source, particularly in urban areas, is likely to be road traffic although aircraft noise may also affect many schools, with fewer schools exposed to railway noise. A survey in 2012 carried by D Debnath, S.k nath and N.K Barthakur titled "environmental noise pollution in Educational institute of Nagaon town, Assam, India" found that 46% noise in Educational institute due to vehicles, 40 noise due to student themselves and 9 noise due to people outside and 5 due to construction work and others. Again B. Phukan and k kalita did an experimental study of noise pollution in Guwahati university campus, Guwahati, Assam, India, and according to this study, national high way 37 is mostly responsible for all these noise in the university campus as highways are always liable to have large numbers of vehicles of various kinds plying throughout the day. However Wazir Alam in his research article "GIS based Assessment of noise pollution in Guwahati city of Assam India" mentioned that higher noise level in the city is due to rapid and unplanned urbanization resulting in great influx of people from all parts of the region and country, improper management of city roads and traffics, lack of sufficient parking spaces and exponential growth of both private and public vehicles in the city. The greenery and forest cover decreasing at alarming rate due to unplanned growth and urbanization has resulted in reducing noise cushion in the city [5,6]. Narrow linking roads, absence of arterial roads and lack of flyovers and over bridges in some locations of the city are

responsible for huge gathering of vehicles resulting in a chaotic and noisy environment.

EFFECT OF NOISE ON CHILDREN:

Due to high noise in educational institutions students cannot concentrate in classroom teaching and they lose interest to study silly noise pollution also effects the teachers they cannot teach effectively during teaching session because of uncomfortable classroom conditions.

A noise study was carried out in two public schools in Valencia, Spain. One School was exposed to excessively high road traffic noise levels while the other was located in a relatively quiet area. The socio economic level of those schools were very similar. A set of external and internal noise measurements were carried out, along with two different attention tests among the children. Test results were consistently better in the quiet school [2,7].

Hetu *etal* found a significant drop in children's performance particularly in learning to read, when the background noise level interfered with speech. Similar results were obtained by Maxwell and Evans in a study of pre-school children who had been exposed to levels in the classroom of 75 dB. Following acoustic treatment to reduce the noise, the children's performance improved in letter, number and word recognition [1,2]. In contrast, in a study of older children, aged 13 and 15, working in levels of 58 to 69 dB during mathematics classes there was poor correlation between sound level and standard of work.

Measures for reduction of noise:

The following range of measures to be taken to reduce noise pollution in education institutes

1. The educational institutes have criteria of a good planning for an institute and it should be located far from main road, busy pwd roads, and other noise sources.
2. Educational institutes should have buildings that have sound insulation system and high fence using concrete walls which protect noise from outside.
3. Educational institutes should be aware of plantation of trees and vegetation buffer zone because trees and vegetation can absorb 4dB to 6dB noise intensity depending on their characteristics.
4. Students, teachers and public awareness would also helpful in reduction in noise level in educational institutes.
5. A strict law concerning noise pollution in educational institutes should be implemented.

Table 1: Ambient noise level to be maintained (Environment Protection Rules, 1986)

S/N	Area Code	Category of Area	Day time (6 a.m. & 9 p.m.)	Night time (9 p.m. & 6 a.m.)
1.	A	Industrial Area	75dB	70dB
2.	B	Commercial Area	65dB	55dB
3.	C	Residential Area	55dB	45dB
4.	D	Silence Zone	50dB	40dB

CONCLUSION:

This paper reviews the sources, effects and controlling ways for excessive noise. Automobiles, industries, highway, transport, airport, railways and public address system Turns out to be major sources of noise pollution. Most of our day-to-day activities, by knowingly or unknowingly every one of us contribute to generate noise pollution. Often neglected noise pollution adversely affects the students in teaching learning process. It is harmful for academic performance of students [11, 17]. Indirectly, noise pollution can destroy their life generations by generations

silently. It is a great threat to both health and education of students. Because high level of noise may no cause serious or immediate effects but if such noisy environments prevail, it may impact the population in many ways. Hence, the educated people may complain to the statutory Board for violation of noise level limits by any noise generator [15, 16]. The suitable action will be taken to attenuate the noise levels and controlling pollution. In future, public education, governments and NGOs can play significant role in controlling the noise pollution.

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SLUM ERADICATION POLICIES AND GUIDELINES & THEIR IMPACT ON SLUM DWELLERS

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ABSTRACT

After independence, immediately after partition, many people migrated to India, which created an immense scarcity of housing and shelter. Also an increase of commercial and industrial activity resulted in demand for labour in the cities. In order to meet this demand, people from rural areas were encouraged to move to the cities and work. This migrant work force later brought their relatives, friends and rest of the family members to the cities. Unable to find cheap housing, they built their shelter closer to work places. Gradually the number of shelters grew and resulted in a 'slum'. Food, clothes and shelter are the three basic needs for every human being residing on this planet. Without these three basic needs fulfilled, all the other progress or development claims as advertised by the government are fluke or hypocrisy. India, which is one of the fastest growing economy in the world and one of the fastest developing countries of the

world, and yet there are millions homeless. According to 2011 censuses, there are 1.3 crore urban slum households. The government had launched many ambitious schemes in order to tackle the problem of slum dwellers and urban housing for the poor like the Jawaharlal Nehru National Urban Renewal Mission (JnNURM), Basic Services to the Urban Poor (BSUP), Integrated Housing & Slum Development Programme (IHSDP), Rajiv Awas Yojana (RAY) etc. for a slum free city. In Guwahati alone, in the year 2010-11, around Rs.10 crore was spent but the condition and the number of slums still remains the same. A total of around 170 slums have been identified in the city of Guwahati, covering an area of approximately 1.28 sq. km with a total slum population of 90500. It must be mentioned here that more than 60% of India's GDP comes from cities and the bulk of city services is provided by the informal sector, and the population residing in the slums. And yet it is

to be noted that in most of the development projects, a quarter of the urban population is excluded. With the eradication of the slums or the upliftment of the living standards of the slum dwellers, socio economic development of a city cannot be done. Slum eradication is a very sensitive and a complex issue. A problem which has been taken up by many governments, many policies formed, but somehow, it has never been solved. There has always been an increase in the number of slums and slum dwellers. So without forming proper scientific guidelines, slum eradication can never be achieved.

INTRODUCTION:

After independence, commercial and industrial activity resulted in demand for labour in the cities. In order to meet this demand people from rural areas were encouraged to move to the cities and work. This migrant work force later brought their relatives, friends, and rest of the families to the cities. Unable to find cheap housing, they built their shelter closer to work places. Gradually the number of shelters grew and resulted in a 'slum'.

India's urban population is increasing at a faster rate than its total population. With over 575 million urban populations, India will have 41% of its population living in cities and towns by 2030 from the present 28% of the population totalling 286 million. Due to rapid urbanization, the number of slum dwellers is rising in Indian cities. The slum population has increased from 27.9 million in 1981 to over 40 million in 2001.

The policies of urban development and housing in India have come a long way since 1950s. The pressure of urban population and lack of housing and basic services were very much evident in the Indian cities. Many ambitious scheme was undertaken by the Government of India.

Currently, Hon'ble Prime Minister, Sri Narendra Modi launched the ambitious AMRUT (Atal Mission for Rejuvenation and Urban Transformation), and PMAY (Pradhan Mantri Aawas Yojna) a housing scheme for solving the housing problem of our country. In spite of so many ambitious schemes taken up by the government, and crores of rupees spent annually, the ground reality still remains that according to 2011 census, there are 1.3 corer urban slum households in India.

PROBLEM STATEMENT:

The government had launched many ambitious schemes in order tackle the problem of slum dwellers and urban housing for the poor like the Jawaharlal Nehru National Urban Renewal Mission (Jn NURM), Basic Services to the Urban Poor (BSUP), Integrated Housing & Slum Development Programme (IHSDP) and the Rajiv A was Yojana (RAY) for a slum free city.

The Hon'ble Ex Prime Minister of India, Dr. Manmohan Singh in his address to the Nation on 15th August 2009 stated "*We have started the Jawaharlal Nehru National Urban Renewal Mission (Jn NURM) for the urban areas. We will accelerate this programme. Today, lakhs of*

our citizens live in slums which lack basic amenities. We wish to make our country slum free as early as possible. In the next five years, we will provide housing facilities to slum dwellers."

In Guwahati alone, in the year 2010-11, around Rs. 10 corer was spent but the condition and the number of slums still remains the same. Around 170 slums have been identified in the city of Guwahati, covering an area of approximately 1.28 sq. km with a total slum population of 90500. The slum population amounts up to 9 percent of the total population of city of Guwahati. 37 percent of the slums in Guwahati came up in the past 40 years. On an average there is an increase of 12 new slums per decade in Guwahati. The oldest slum in Guwahati is 130 years old and the 3 slums are more than 100 years old. The urban poor mostly constitute of rural migrants from nearby villages. More than 20 slums are 21-30 years old and most of the slums are in core areas of the city.

In spite of so many ambitious projects, crores of money spent the conditions of slums still remains grim. There is still a massive shortage of housing and still there is no improvement in the conditions. It need to be urgently studied what and where it went wrong?

DEFINITION:

According to Dr. Panab Sen Committee report on slum statics/census, "A slum is compact settlement of at least 20 House-Holds (10-15 House-Holds for North-East and

special category states) with collection of poorly built tenements, mostly temporary nature, crowded together usually with inadequate sanitary and drinking water facilities in unhygienic conditions."

In general a slum can be defined as "*a cluster of hutments with dilapidated and infirm structures, suffering from lack of basic amenities.*"

SOME OF OTHER DEFINITIONS USED FOR SLUMS:

I. For the purpose of the survey in 1993 and 2002, NSSO adopted the definition of slums as "*A slum is a compact settlement with a collection of poorly built tenements, mostly of temporarily nature, crowded together usually with inadequate sanitary and drinking water facilities in unhygienic conditions. Such an area, was considered as "notified slum" if at least 20 households lived in that area. Areas notified as slums by the respective municipalities, corporations, local bodies or development authorities are treated as "notified slums".*

II. UN-HABITAT defines "*A slum is a contiguous settlement where the inhabitants are characterized as having inadequate housing and basic services. A slum is often not recognized and addressed by the public authorities as an integral or equal part of the city.*" Slum households as a group of individuals living under the same roof that lack one or more of the condition listed below:

- i. Insecure residential status;

- ii. Inadequate access to safe water;
- iii. Inadequate access to sanitation and other infrastructure;
- iv. Poor structural quality of housing;
- v. Overcrowding.

As per Census of India, the definition of Slum has evolved based on the present condition of the urban poor. Presently the definition of slum adopted is as follows:

“Residential areas where dwellings are unfit for human habitation by reasons of dilapidation, over crowding, faulty arrangements and design of such buildings, narrowness or faulty arrangement of street, lack of ventilation, light, or sanitation facilities or any combination of these factors which are detrimental to the safety and health.”

For the purpose of Census, slums have been categorized and defined as of the following three types:

- **Notified Slums-** All notified areas in a town or city notified as ‘Slum’ by State, UT Administration or Local Government under any Act including a ‘Slum Act’
- **Recognized Slums-** All areas recognised as ‘Slum’ by State, UT Administration or Local Government, Housing and Slum Boards, which may have not been formally notified as slum under any act .
- **Identified Slums-** A compact area of at least 300 populations or about 60-70 households of poorly built congested tenements, in unhygienic environment usually with inadequate infrastructure and

lacking in proper sanitary and drinking water facilities (Identified).

DEFINITION OF SLUM IN ASSAM:

Assam has Assam Slums Area (Improvement & clearance) Act 1959, as adopted from “Slum Areas (Improvement and Clearance) Act, 1956”. As per the act the definition of slum as follows:

Declaration of slum areas: *Where the competent authority upon report from any of its officers or other information in its possession is satisfied as respects any area that the buildings in that area-*

- *are in any respect unfit for human habitation; or,*
- *are by reason of dilapidation, overcrowding, faulty arrangement and design of such buildings, narrowness or faulty arrangement of streets, lack of ventilation, light or sanitation facilities, or any combination of these factors, are detrimental to safety, health or morals, it may, by notification in the Official Gazette, declare such area to be a slum area.*

In determining whether a building is unfit for human habitation for the purposes of this Act, regards shall be made to its condition in respect of the following matters, that is to say-

- repair;
- stability;
- freedom from dampness;
- natural light and air;

- water supply;
- drainage and sanitary conveniences;
- facilities for storage, preparation and cooking of food and for the disposal of waste water;
- and the building shall be deemed to be unfit as aforesaid if and only if it is so far defective in one or more of the said matters that it is not reasonably suitable for occupation in that condition.

AMBITIOUS PROGRAMMES FOR SLUM DEVELOPMENT

- **Basic Services for the Urban Poor (BSUP) :** Basic Services for the Urban Poor (BSUP) can be considered as the first initiative to provide housing for the urban poor. As a part of Jn NURM, mandatory reforms for urban poor are: Internal earmarking, within local bodies, budgets for basic services to the urban poor. In general, about 15 to 20% of the budget is to be used for urban poor.
- **National Urban Livelihood Mission:** The National Urban Livelihood Mission is a recent initiative of the Government of India to reduce poverty and vulnerability of the urban poor households by enabling them to access gainful self-employment and skilled wage employment opportunities, resulting in an appreciable improvement in their livelihoods on a sustainable basis, through building strong grassroots level institutions of the poor.
- **Assam State Housing Schemes:** The Assam State Government enacted the

Assam State Housing Board Act in 1972, and ASHB was established in 1974. ASHB constructs public housing in Assam through a number of schemes.

- **JANATA housing Scheme(JHS) :**Under this scheme, financial assistance in terms of subsidy and loan is provided to the EWS which includes all categories of people such as General, S.C., S.T., for all general areas and hill areas of Assam. In Janata housing scheme a maximum financial assistance amounting to Rs.25,000/- is provided, for construction of house, out of which Rs.19,000/- is loan and Rs.6000/- is subsidy.
- **HUDCO finance for Composite housing schemes**
- **Project under Non-lapsable central pool resources (NLCPR):** Under this scheme the govt. of India has accorded of Rs. 8.21 corer and Rs 53.18 corer under NLCPR for construction of 180 units and 640 units respectively for urban poor. The construction work of 180 units already completed and allotted and construction of 640 units is entrusted to National Building Construction Corporation (NBCC) and 320 out of 640 are constructed and allotted.
- **Rajiv Awas Yojna (RAY):** The Rajiv Awas Yojna (RAY), launched in pursuance of this vision of "Slum free India" in June in 2011, in two phases; the preparatory phase for a period of two years which ended in June 2013 and implementation phase. The

implementation phase has been approved for the period of 2013-2022. RAY envisages two-step implementation strategy i.e. preparation of Slum free City Plan of Action (SFCPOA) and preparation of housing project for selected slum.

SLUM PREVENTIVE STRATEGIES

- Formation of new slums can be prevented in the future by bringing about the Policy Reforms and catering to the supply and demand constraints in the urban housing market. This is done to prevent squatting and proliferating of slums in the city and to provide affordable housing to the city's poor population.
- As slum settlements grow faster than the rest of the city, housing estimates must be prepared accordingly and land should be provided at affordable prices to low income labour force working near housing colonies, near industries and other construction sites and to poor people working in the service sector to avoid the growth of slums in the city.
- Steps must be taken so that the rural population do not need to migrate to the urban area in search of better living conditions or employment schemes. This can be done by proper development of the rural areas so that the need for migration do not arise.
- Strict policies must be made also public must be made aware so that

encroachment of land, hills and water bodies do not take place for building up a new slum.

SLUM DEVELOPMENT PERSPECTIVES

Slums are plagued with numerous issues and constitute one of the fundamental global challenges of present times though development plans have been under implementation since many years. Many of such schemes adopted earlier have laid substantial stress on adaptive approaches at the cost of proactive approaches, thus not being able to address the subtleties of slum development in the right perspective. It is now recognised that a permanent resolution to improving lives of the slum dwellers is not the only perspective of slum development because equal efforts should be taken towards planning a new urban growth in a way which ensures future migrants are not forced to live in slums. Therefore cutting edge approaches are required which deal with the problems of slums as a whole.

Adaptive approaches are economically feasible strategies for improving the existing slums in order to integrate them into the social-economic fibre of the city. Some such approaches are:

1. Security of land tenure through issue of ownership rights which requires new legislations in the area of urban land use.
2. Provision of adequate physical infrastructure like water supply,

sanitation, sewerage, drainage, roads and electricity.

3. Provision of adequate health infrastructure through primary health centres.
4. Provision of appropriate education facilities through primary schools.
5. Provision of livelihood centres/skill improvement programmes for economic betterment.

TYPE OF SLUM DEVELOPMENT

Five types of development strategies may be employed:

1. **Development of Infrastructure only without housing:** This strategy is valid for slums which have 100% pucca houses. The deficiencies in the infrastructure by overcome by undertaking necessary works to plug the gaps.

2. **Development of Housing and Infrastructure (Upgradation):** In slums which have a mix of katcha and pucca houses, this strategy aims to develop the katcha houses. Simultaneously, gaps in the infrastructure will also be filled by formulating appropriate proposals.

3. **Redevelopment:** This strategy is specifically for slums which are having a large percentage of katcha houses. In such a scenario a totally new layout will be implemented along with necessary physical infrastructure.

4. **Redevelopment and Upgradation:** This is a special class of strategy in

which slums which have both housing and or infrastructure deficiencies will be taken up for development.

5. **Relocation:** This strategy is designed for slums which are located in untenable zones and hence have to be relocated either an existing slum or a new area or colony.

FIND ALTERNATIVES TO NEW SLUM FORMATION.

Cities need to introduce proactive measures for producing viable alternatives to slums.

1. Earmarking adequate land for EWS and LIG segments of the Society with tenure security, thereby addressing the issues of demand for land, housing, physical and social infrastructure and priorities for land use should be established. E.g. Transportation etc.
2. The city bylaws should be practically formulated in order to provide greater FSI to these sections of the society.
3. Provision of adequate physical, social, and economic infrastructure in rural areas in order to discourage migration to urban centres.
4. Develop satellite towns, cluster towns, and urban corridors with employment opportunities in order to decongest the core urban area and reduce land demand for housing.
5. Devise and implement "Regional Development Plan" in conjunction with the CDP in order to reduce

regional imbalances and encourage development of counter-magnet towns.

CONCLUSION

Slum eradication is a very sensitive and a complex issue. A problem which has been taken up by many governments, many policies formed, but somehow, it has always been seen that the housing scarcity are ever increasing. There has always been an increase in the number of slums.

Through my research, it shall be found out why, inspite of such ambitious schemes, even after almost 70 years of independence, slums has not been eradicated. It shall be found out why most of the government policies have failed in solving the problems.

It shall also open the gates for further research in this stream, and shall help in formulating more realistic guidelines and policies for slum eradication.

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- Hyderabad Municipal Corporation – SFCPoA Hyderabad.
- Govt. of India – BSUP Guidelines.

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MACROPHYTIC DIVERSITY OF WETLANDS OF SUALKUCHI AREA UNDER KAMRUP DISTRICT, ASSAM

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ABSTRACT

Present investigation was carried out to evaluate the macrophytic diversity of wetlands of Sualkuchi area under Kamrup district, Assam during the year February, 2016 – March, 2017. During the period of study a total 56 macrophytic species belonging to 39 genera of 23 families were recorded. Out of them 25 species from Dicotyledons under 12 families and 28 species from Monocotyledons under 8 families and 3 species from Pteridophytes under 3 families were recorded. The findings of this study are expected to provide a baseline information on the aquatic macrophytic diversity of this area.

Key Words: Wetlands, Macrophytic diversity

1. INTRODUCTION:

The wetlands maintain the ecosystem of an area by sheltering many species of aquatic plants, fishes and insect etc. Wetlands represent a combination of aquatic and

terrestrial environment in which the soil is seasonally or permanently covered by shallow water and the water table is close to near the surface (Ramachandra *et al.*, 2003). Aquatic macrophytes include photosynthetic plants, large enough to see with the naked eye that grows in or near water.

The macrophytes are the important source of food, fodder, herbal medicine and domestic household materials for the people residing in its vicinities. The macrophytic diversity and its role in understanding the beel ecosystem have tremendous significance. Many young fish need aquatic macrophytes as shelter and protection from predation or to avoid cannibalism. It also serve some fish as a spawning habitat, for the attachment of eggs, and some fish form nesting sites among the macrophytes (Cowx and Welcomme, 1998).

Several works relating to aquatic and wetland flora have been carried out by several workers in various parts of the country (Dey

and Kar, 1989; Padial *et al.*, 1998; Baruah and Baruah, 2000; Deka *et al.*, 2010; Bordoloi, 2014; Dutta *et al.*, 2014; Deka and Sarma, 2015; Kalita and Choudhury, 2016 etc). Till now no study regarding the diversity of aquatic macrophytes of Sualkuchi area wetland had been carried out. Therefore the present investigation was designed to evaluate the macrophytic diversity of these wetlands during February 2016 to March, 2017.

2. MATERIALS AND METHODS:

Study Area: - The present study is carried out at wetlands of Sualkuchi area of Kamrup district, Assam. Sualkuchi is situated at the north bank of the river Brahmaputra, about 35 km from Guwahati of Kamrup District, Assam and is located at 6.17°N latitude, 91.57°E longitude and 33 m altitude. It covers a total area of about 9.37 square kilometres.

Methodology: - To study the diversity and phenology of the aquatic macrophytes monthly surveys were carried out. The aquatic plants were collected and they were photographed, packed in the plastic bags for making dry herbarium or kept in the bottles filled with 70% FAA solution and taken to the laboratory for further identification. In the field while collecting the plant, special attention was given to observe and record the morphological characters which cannot be observed in herbarium specimens. The conventional herbarium techniques as suggested by Jain and

Rao (1977) were followed for collection and preparation of herbarium specimens. Identifications were done by consulting herbaria of Department of Botany Gauhati University. For the up to date nomenclature www.theplantlist.org and Plant Diversity of Assam (Barua and Ahmed, 2014) has been consulted.

3. RESULTS:

During the present study 56 macrophytic species belonging to 39 general and 23 families were recorded from wetlands of Sualkuchi area of Kamrup district, Assam with their reproductive phases (Table 1). Out of which 20 families belong Angiosperms (12 Dicot and 11 Monocot) and 3 families to Pteridophytes (Table 3). Dominant families were Poaceae with 7 species followed by Nymphaeaceae (4), Polygonaceae (4), Lamnaceae (4), Cyperaceae (4), Onagraceae (3), Convolvulaceae (3), Hydrocharitaceae(3), Commelinaceae (3), Araceae(3), Halograceae (2), Menyanthaceae (2), Lentibularaceae (2), Amaranthaceae (2), Pontederiaceae (2), Alismataceae (2) and rest of the families were monospecific (Table 2). Out of 39 genera *Cyperus* is found as most dominant genera with 4 species followed by *Nymphaea*, *Ipomoea* and *Polygonum* with 3 species followed by *Myriophyllum*, *Nymphoides*, *Utricularia*, *Alternanthera*, *Saccharum* and *Setaria* with 2 species (Table 1).

Table 1: - List of macrophytes along with their type and reproductive phases
(MA = Marshy Amphibious; FA = Floating aquatic; SA = Submerged aquatic;
EA = Emergent aquatic; FF = Free Floating)

Type	Name of Species	Family	Flowering & Fruiting
Free Floating	1. <i>Eichhornia crassipes</i> Solms	Pontederiaceae	Jan. – Dec.
	2. <i>Pistia stratiotes</i> L	Araceae	Jun – Sept.
	3. <i>Lemna perpusilla</i> Torr.	Lemnaceae	May – Aug.
	4. <i>Spirodela polyrhiza</i> L.	Lemnaceae	Jan. – May
	5. <i>S. punctata</i> (Meyer) Thomson	Lemnaceae	Jan. – May
	6. <i>Wolffia arrhiza</i> (L.) Hook	Lemnaceae	Jun. – Sept.
	7. <i>Azolla pinnata</i> R.Br	Salvinaceae	Mar. – Nov.
	8. <i>Salvinia natans</i> Hoffins.	Salvinaceae	May – Sep.
Floating Aquatic	1. <i>Euryale ferox</i> Salish	Nymphaeaceae	May – Jul.
	2. <i>Nymphaea pubescens</i> Willd.	Nymphaeaceae	June – Nov.
	3. <i>N. nouchali</i> Burm f	Nymphaeaceae	Jul. – Oct.
	4. <i>N. rubra</i> Roxb. ex. Salisb,	Nymphaeaceae	Aug. – Dec.
	5. <i>Nelumbo nucifera</i> Gaetrn.	Nelumbonaceae	July.-Oct.
	6. <i>Myriophyllum tetrandrum</i> Roxb.	Haloragaceae	May – Nov.
	7. <i>M. tuberculatum</i> Roxb.	Haloragaceae	Jan. – Dec.
	8. <i>Trapa natans</i> L.	Trapaceae	Jul. – Dec.
	9. <i>Nymphoides hydrophyllum</i> Kuntz.	Menyanthaceae	Sept.-Oct.
	10. <i>N. indica</i> (L.) Kuntze	Menyanthaceae	Sept.-Oct.
	11. <i>Marsilea quadrifolia</i> L.	Marsiliaceae	May. – Sep.
Submerged Aquatic	1. <i>Utricularia scandens</i> Ben	Lentibulariaceae	July – Nov.
	2. <i>U. Stellaris</i> L.f.	Lentibulariaceae	Mar. – Nov.
	3. <i>Hydrilla verticillata</i> (Lf.) Royle	Hydrocharitaceae	Oct. – Mar.
	4. <i>Ottelia alismoids</i> (L.) Pers.	Hydrocharitaceae	Aug.- Nov.
	5. <i>Valisneria spiralis</i> L.	Hydrocharitaceae	Mar.-Nov.
	6. <i>Alisma plantago-aquatica</i> L.	Alismataceae	Feb. – Apr.
Emergent Aquatic	1. <i>Ludwigia parviflora</i> Roxb.	Onagraceae	June – Oct.
	2. <i>L. perennis</i> L.	Onagraceae	Aug – Dec.
	3. <i>Jussiaea repens</i> L.	Onagraceae	Jun – Oct
	4. <i>Enhydra fluctuans</i> Lour.	Asteraceae	Mar. – Dec.
	5. <i>Ipomoea aquatica</i> Forsk.	Convolvulaceae	Sep. – Feb.
	6. <i>I. carnea</i> Jaeq.	Convolvulaceae	Sep. – Feb.
	7. <i>I. obscura</i> (L) Gawl.	Convolvulaceae	Aug. – Oct.
	8. <i>Alternanthera philoxeroides</i> L.	Amaranthaceae	Oct. – Feb.
	9. <i>Monochoria hastata</i> L.	Pontederiaceae	Feb. – Nov.
	10. <i>Floscopa scedens</i> L.	Commelinaceae	Jan. – Jun.
	11. <i>Sagittaria sagittifolia</i> L.	Alismataceae	Feb. – Apr.

	6. <i>I. carnea</i> Jaeq.	Convolvulaceae	Sep. – Feb.
	7. <i>I. obscura</i> (L) Gawl.	Convolvulaceae	Aug. – Oct.
	8. <i>Alternanthera philoxeroides</i> L.	Amaranthaceae	Oct. – Feb.
	9. <i>Monochoria hastata</i> L.	Pontederiaceae	Feb. – Nov.
	10. <i>Floscopa scedens</i> L.	Commelinaceae	Jan. – Jun.
	11. <i>Sagittaria sagittifolia</i> L.	Alismataceae	Feb. – Apr.
	12. <i>Arundo donax</i> L.	Poaceae	Aug. – Jan.
	13. <i>Hygroryza aristata</i> Nees.	Poaceae	Sep. – Mar.
	14. <i>Phragmites karka</i> (Retz.) Trin	Poaceae	Sept. – Jan.
	15. <i>Saccharum revennae</i> (L.) Murry	Poaceae	Sept. – Dec.
	16. <i>S. spontanium</i> L.	Poaceae	Sept. – Dec.
	17. <i>Setaria gluca</i> Beauv	Poaceae	Mar. –Nov.
	18. <i>S. Italica</i> Beauv	Poaceae	Mar. –Nov.
Marshy Amphibious	1. <i>Alternanthera sessilis</i> L.	Amaranthaceae	Jan. – Dec.
	2. <i>Polygonum barbatum</i> L	Polygonaceae	Oct. – Mar.
	3. <i>P. hydropiper</i> L.	Polygonaceae	Oct. – Mar.
	4. <i>P. orientalis</i> L.	Polygonaceae	Apr. – Sept.
	5. <i>Rumex nepalensis</i> Spreng.	Polygonaceae	Apr. – Jul.
	6. <i>Commelina benghalensis</i> L.	Commelinaceae	Jan. – May
	7. <i>Murdannia nudiflora</i> L.	Commelinaceae	Jul. – Jan.
	8. <i>Alocasia fornicata</i> (Roxb.) Schott	Araceae	May – Sept.
	9. <i>Colocassia esculanta</i> L.	Araceae	May – Sept.
	10. <i>Cyperus compressus</i> L.	Cyperaceae	July – Nov.
	11. <i>C. iria</i> L.	Cyperaceae	Aug. - Dec.
	12. <i>C. pilosus</i> Vahl, Enum	Cyperaceae	Aug. - Dec.
	13. <i>C. rotundus</i> L.	Cyperaceae	Mar. – Nov.

Table 2: - List of families with number of species of wetlands of Sualkuchi area

S. No	Name of families	Nos. of Genus	Nos. of Species
	Dicotyledons (Angiosperms)		
1	Nymphaeaceae	2	4
2	Nelumbonaceae	1	1
3	Haloragaceae	1	2
4	Onagraceae	2	3
5	Trapaceae	1	1
6	Asteraceae	1	1
8	Menyanthaceae	1	2
9	Convolvulaceae	1	3

10	Lentibularaceae	1	2
11	Amaranthaceae	1	2
12	Polygonaceae	2	4
	Monocotyledons (Angiosperms)		
13	Hydrocharitaceae	3	3
14	Pontederiaceae	2	2
15	Commelinaceae	3	3
16	Araceae	3	3
17	Lemnaceae	3	4
18	Alismataceae	2	2
19	Cyperaceae	1	4
20	Poaceae	5	7
	Pteridophytes		
21	Marsiliaceae	1	1
22	Azollaceae	1	1
23	Salviniaceae	1	1
		39	56

The macrophytic species were categorised into 5 categories such as Free-Floating (FF), Floating Aquatic (FA), Submerged Aquatic (SA), Emergent Aquatic (EA), and Marshy Amphibious (MA) (Sculthorpe, 1985; Padial *et al.*, 2008). Among the observed Macrophytes, 13 species were belonging to Marshy Amphibious (MA), 11 species to Floating Aquatic (FA), 6 species to Submerged Aquatic (SA), 18 species to Emergent Aquatic (EA) and 8 species were found as Free Floating (FF) (Fig. 1)).

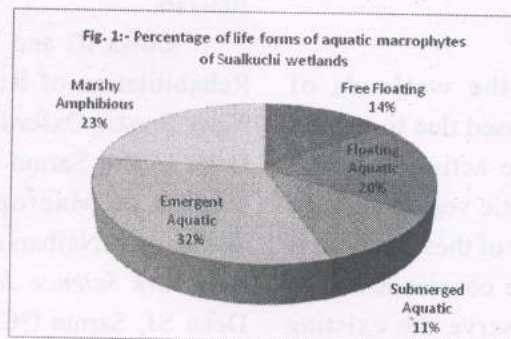


Table 3: - Quantitative analysis of different macrophytic groups in wetlands of Sualkuchi area

Plant Group	Families		Genera		Species		
	Total No	%	Total No	%	Total No	%	
Pteridophytes	3	13.04	3	7.69	3	5.35	
Angiosperms	Dicot	12	52.17	22	56.41	25	44.64
	Monocot	8	34.78	14	35.89	28	50
	23		39		56		

DISCUSSION:

The wetlands of Sualkuchi area appears to be relatively high with respect to the biodiversity of Emergent aquatic macrophytes. The free-floating plants *Eicchornia crassipes*, *Azola pinnata*, *Pistia stratiotes*, *Spirodela polyrhiza*, *Lemna perpusila* are exist throughout the year and they become plentiful during the summer. The Floating Aquatic and Emergent Aquatic plants dominate these wetlands habitat. The foremost are the *Nymphaea rubra*, *Nelumbo nucifera*, *Ipomoea aquatica*, *I. carnea*, *Alternanthera philoxeroides*, *Monochoria hastata*, *Hygroryza aristata* etc. The weeds which are prevalent in the cropped area are *Alternanthera sessilis*, *Polygonum hydroiper*, *P. barbatum*, *Rumex nepalensis*, *Cyperus compressus*, *C. iria*, *C. rotundus*, etc.

CONCLUSION:

A large part of the wetlands of Sualkuchi area are decreased due to natural as well as anthropogenic activities which destroyed the major aquatic vegetations. To protect the floral diversity of these areas, it is necessary to increase the consciousness of the local people to conserve the existing vegetations. Therefore proper conservation

measures should be taken for sustainable livelihood and existence of these important wetland areas.

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<http://www.theplantlist.org>

FOLK CARE HERBAL REMEDIES FOR THE TREATMENT OF JAUNDICE IN BARPETA DISTRICT OF ASSAM

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ABSTRACT

A study on indigenous herbal remedies for the treatment of jaundice was carried out in Barpeta district of Assam. In the study, elderly people, Oja or Bej (local herbalist), Namgharia bhakat (Temple priest), Keolia Bhakat (Baishnavita priest as well as herbalist), Maullavi, Aayi (spiritual woman herbalist) were interviewed throughout Barpeta district. Altogether 31 species of plants belonging to 24 families are in use by the people of the district for the cure of Jaundice. Preliminary biochemical analysis for alkaloids was performed.

Keywords: Herbal, remedies, jaundice, alkaloids, Barpeta district.

INTRODUCTION

Herbal way of healing has long become an important practice that has got deeply rooted into the human society. However, modern technological advancements have forced fast disappearance of these indigenous

and age old traditional methods of herbal way of treatment.

Climatic conditions prevailing in the state of Assam are very much conducive for a very rich and varied floral diversity. This part of India comprises over 100 ethnic tribes and sub-tribes. Because of the importance, there is an increasing desire to unravel the secrets of the age old practices of herbal way of healing. In this study, an attempt has been made to investigate the ethnobotanical remedies of Jaundice in the Barpeta district of Assam and the findings have been documented in this paper.

MATERIALS AND METHODS

Study area: District of Barpeta is also known as 'Land of Satras'. This district of lower Assam covers an area of 2645 sq. Km. It is being bounded by Baska district in the North, Nalbari district in the East, Kamrup and Goalpara districts in the South and Bongaigaon district in the West. Barpeta is situated in

26°32'N latitude and 91°00'E longitude. The general topography of Barpeta district varies from low-lying plains to highland areas with small hillocks in the South-West corner of the district. The soil types of the district are sandy, sandy loam as well as forest soil. Traditional knowledge pertaining to this area were gathered and plants were collected from localities such as Barpeta town areas and adjoining areas, Keotkuchi, Singra, Sundoridia, Vella, Chenga, Bahari, Sarthebari, Bhawanipur, Sarupeta, Pathsala, Bongaon, Howly, Kayakuchi, Nasatra, Borghopa and Jania.

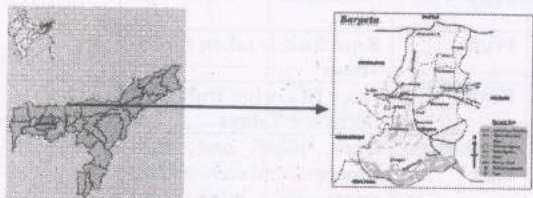


Fig: Map of Assam Fig: Map of Barpeta district

Methods of study: The study was conducted in different localities of Barpeta district during the period from 2014 to 2016 and data were recorded through personal interview of elderly people, Oja or Bej (local herbalist), Namgharia bhakat (Temple priest), Keolia Bhakat (Baishnavita priest and herbalist), Maullavi, Aayi (spiritual woman herbalist) etc. Information pertaining to herbal remedies has been recorded in survey data sheets during the course of investigation.

Collection and identification of the medicinal plants: Plant samples were collected from the field and herbaria were prepared following standard methods (Jain,

1987, 1991). Collected plants were identified with the aid of available literature (Chopra *et al.*, 1956; Kirtikar and Basu, 1991; Kanjilal *et al.*, 1991; Pal and Jain, 1998; Majumdar and Shyam, 2013; Majumdar *et al.*, 2017).

Test for alkaloid: Plant materials were dried and made into powder. It was moistened with distilled water and then mixed with ammonia. Thereafter, benzene was added to the mixture and shaken properly. The extract was concentrated and mixed with dil. H₂SO₄. The mixer was separated into two layers with the help of separating funnel. The collected acidic solution was made alkaline by adding sodium carbonate (Na₂CO₃). The precipitate was extracted in ethanol. Later it was tested by Mayer's reagent, Dragendroff's reagent and Wegner's reagent respectively (Buzarbarua, 2000).

RESULT AND DISCUSSION

The local people have maintained deep faith in the traditional systems and the age old system of healing still have a strong hold on the local population. In the present study, it was found that the plants that are traditionally used for the treatment of jaundice disease are belonging to 24 Angiospermic families that comprise of 31 species under 30 different genera. The families of the collected plants were Amaranthaceae, Araceae, Avertrocheae, Clusiaceae, Combricitaceae, Euphorbiaceae, Lamiaceae, Asteraceae, Apocynaceae, Nyctaginaceae, Acanthaceae, Verbinaceae, Zingiberaceae, Papilionaceae, Menispermaceae,

Apiaceae, Cyperaceae, Poaceae, Musaceae, Liaceae, Rutaceae, Moraceae, Cuscutaceae and Bignoniaceae. The ethnobotanical information like vernacular name, family name, mode of administration, plant parts used, test

for the presence of alkaloid are mentioned in the table given above (Table: 1).. All the plant samples tested positive (+) for the alkaloid tests.

Table 1:- Ethnobotanical information of the collected plants.

Sl No	Botanical Name	Common Name	Family	Plant parts used	Mode of administration (taken orally)	Test for alkaloid
1	<i>Amaranthus spinosus</i> L.	Kata khutura	Amaranthaceae	Whole plant	Juice of the plant is taken once daily for 7 days.	+
2	<i>Alocasia macrorrhizos</i> (L) G. Don.	Mankachu	Araceae	Corm	Extract is boiled & mixed with kordoi fruit and taken orally.	+
3	<i>Colocasia esculenta</i> (L) Scott.	Kolakachu	Araceae	Leaf petiole	Juice of leaf petiole is taken once daily for 7 days.	+
4	<i>Averrhoa carambola</i> L.	Kordoi tenga	Averrhoaceae	Fruit	Ripe fruit is taken for 7days	+
5	<i>Garcinia pedunculata</i> Roxb.	Bor thekera	Clusiaceae	Fruit	Juice of unripe fruit is taken for 7 days	+
6	<i>Terminalia bellirica</i> (Gaertn) Roxb.	Bhomora	Combretaceae	Fruit and bark	Bark juice and fruit power mixed with sugarcane juice and taken for 5 days.	+
7	<i>Terminalia chebula</i> Retz.	Silikha	Combretaceae	Fruit	Grinded fruit is taken with old sugarcane juice for 5 days	+
8	<i>Euphorbia nerifolia</i> L.	Siju	Euphorbiaceae	Stem and leaf	Leaves and young stem paste is taken with milk and sugar for 5 days	+
9	<i>Phyllanthus niruri</i> L.	Bhui amlakhi	Euphorbiaceae	Whole plant	Juice of whole plant is taken twice daily for 7days	+
10	<i>Mentha arvensis</i> L.	Podina	Lamiaceae	Leaf	2-3 teaspoonful leaf juice is taken 2-3 times daily for 9 days.	+
11	<i>Leucas aspera</i> Wild.	Doron phul	Lamiaceae	Leaf	12-15 nos. of leaf and 3-4 nos. of inflorescence from the respective plants are crushed and made into pills; 1 pill is taken thrice daily for 6 days after meal.	+
12	<i>Acmella paniculata</i> (Wall. ex DC.) R.K. Jansen	Jari gass	Asteraceae	Inflorescence		+
13	<i>Allamanda cathartica</i> L.	Ghonta phul	Apocynaceae	Leaf	Leaf extract is taken in empty stomach for 11days	+
14	<i>Eclipta prostrata</i> L.	Kehraj bon	Asteraceae	Leaf and flower	Leaf and flower juice is taken with sugar for 14 days	+

15	<i>Boerhavia diffusa</i> L.	Punarnova	Nyctaginaceae	Leaf and stem	Stem and leaf juice is mixed with milk and sugar and taken for 5 days	+
16	<i>Justicia adhatoda</i> L.	Bahak tita	Acanthaceae	Whole plant	Extract of whole plant is mixed with honey and taken once daily for 5 days	+
17	<i>Vitex peduncularis</i> Wall.	Ahoi	Verbinaceae	Root	Dried root powder is mixed with honey and milk and taken for 9 days	+
18	<i>Cheillocostus speciosus</i> (J. Koenig)	Devitokan	Zingiberaceae	Rhizome	Rhizome juice is taken with milk and sugar for 3 days	+
19	<i>Tinospora sinensis</i> (Lour.) Mierr.	Sagunilota	Menispermaceae	Stem and leaf	Stem and leaf juice is mixed with honey and taken for 7 days	+
20	<i>Classampelos pareira</i> L.	Tupurilota	Menispermaceae	Leaf	Leaf juice is taken with milk and sugar for 3 days	+
21	<i>Centella asiatica</i> (L.) Urb.	Saru manimuni	Apiaceae	Leaf	Leaf extract taken as for one month	+
22	<i>Hydrocotyle javanica</i> Thumb.	Bor manimuni	Apiaceae	Leaf and young stem	Juice is taken for 1 month	+
23	<i>Cyperus rotundus</i> L.	Keya bon	Cyperaceae	Tuber	Paste of tuber is mixed with milk and sugar and taken for 3 days	+
24	<i>Saccharum officinarum</i> L.	Kuhiyar	Poaceae	Stem	Stem juice is taken once daily for 15 days	+
25	<i>Musa balbisiana</i> Colla	Bhim kol	Musaceae	Root	Root juice is mixed with milk and sugar and taken for 15 days	+
26	<i>Leea asiatica</i> (L.) Rid.	Aiha Bon	Liaceae	Root	Root juice is taken once daily for 3 days	+
27	<i>Glycosmis pentaphylla</i> (Retz.) DC.	Chauldhowa	Rutaceae	Bark	Bark juice is mixed with curd and rice and taken for 3 days	+
28	<i>Streblus asper</i> Lour.	Saura	Moraceae	Bark	2 spoonful bark juice is taken once daily for 3 days	+
29	<i>Cuscuta reflexa</i> Roxb.	Ravan nari	Cuscutaceae	Whole plant	Plant juice is taken once daily for 3 days	+
30	<i>Oroxylum indicum</i> L. Kurz	Ding ding	Bignoniaceae	Bark	Bark paste is mixed with tender coconut	+
31	<i>Cajanus cajan</i> (L.) Millsp	Rahar	Papilionaceae	Leaf	Leaf juice is taken once daily in empty stomach for 3 days	+

CONCLUSION:

The present study revealed that traditional herbal remedies for jaundice have been playing a vital role till today in different villages of Barpeta District of Assam. These age old practices, on one hand play a major role in the field of health care and at the same time it is helpful in the conservation of biodiversity. Again, this traditional knowledge concerning medicinal plants among the local people may be used for future pharmacological research. Due to lack of proper conservation strategy of these medicinal plants, there is every possibility that several important components that are present in these plants used in traditional health care systems would get lost forever. Hence, there is an urgent need for proper documentation and in depth scientific study of the traditional health care system of the people of Barpeta district for the benefit of the scientific community and the rural people in particular.

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Nesting behaviour of few common birds found in Sualkuchi area, Kamrup, Assam

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INTRODUCTION:

Birds are among the most beautiful creatures in earth. It has attracted human attention since time immemorial to their beauty. Their flying habit as well as nesting behaviour counts the other side of the attraction. Birds are an important source of food to several communities. Besides, their aesthetic and economic value, birds are now being assigned high ecological 'value' because of the vital links they provide in the food chains, and the key role they play in nutrient cycling in ecosystems. Before any detailed ecological investigation of the birds' of a given area, it is essential that a checklist or an inventory of taxa be prepared and updated from time to time. Though, such studies have received fairly adequate attention in other parts of India, yet very little information is available from Northeast India in general and Assam in particular.

Nest building is a taxonomic indication of different genera as well as species of animals including birds, mammals, reptiles, fishes, insects, etc. All these animals construct their nest for breeding and shelter of their offspring which varies locations, building materials and design across taxa. Even within the taxa, there is great deal of variation in design, yet all nests have the same basic, minimal, function which is to provide a receptacle for animals to lay their eggs and/or raise their developing offspring. There is considerable evidence that nest are sophisticated structures that require considerable cognitive abilities to construct. Given the critical importance of nests in determining the survival of offspring, it is expected that nest building behavior should be under strong natural selection, and that nest design, construction and structure should be adapted to processes of natural selection to local environmental conditions. It is interestingly recognized that because some

aspects of nest construction and/or design may play an important role in mate choice, nest building may also be subject to processes of sexual selection. For these reasons and others, the nest construction behavior of animals has become recognized by a wide variety of lab and field based biologists including those with interests in animal cognition, physiology, behavior, ecology and evolutionary processes – as a topic demanding a detailed academic investigation.

As there is no any information regarding nesting behaviour of birds in Sualkuchi area of Kamrup district, Assam the present study has been made to evaluate the nesting behaviour as well as their kinds, and their conservation status of this area.

MATERIALS AND METHODS:

Birds provide excellent models for the scientific study of nesting behaviour. The present study has been made by simple observation and taking photographs. Data were collected in various part of the Sualkuchi area. Various types of birds and their nests were captured by camera and recorded the observations. The nesting materials that the birds used to build their nest were observed and recorded.

RESULTS:

The data were collected during July 2016 to June 2017. Nest construction activity was observed from 1st week of December. For that they collected twigs, sticks, branches of different trees, straws, thatches, leaves, etc. Nests were constructed in trees, shrubs, bushes, grasses, old buildings, etc. surrounding the river, ponds and beels. The construction works were completed by the mid-January. Mating and egg laying was observed from January to March. Generally, female lays 2-10 nos. of eggs in respect of species. The incubation period ranges 12-30 days. Both male and female incubate the eggs and by the end of March, nestling was observed in almost all the nests. Both male and female perform all parental care including feeding young ones. In the months of May and June, the entire fledglings leave nests alone or along with their parents. Different types of birds visit Sualkuchi area during the breeding season. While nesting, birds usually give preference to the safety of nests, availability of nesting materials and plenty of food. All these conditions are by and large favourable in Sualkuchi area, hence every year various types of birds come to this area during breeding season. Seventeen common birds were recorded and considered for the study (Table 1 & 2).

Table 1: Some common birds, their taxonomy and nest type

Sl. no.	Local name	Scientific name	Order	Family	Nest type
1.	Bank Myna	<i>Acridotheres ginginianus</i>	Passeriformes	Sturnidae	Cavity nester
2.	Pigeon	<i>Ectopistes migratorius</i>	Columbiformes	Columbidae	Scrape
3.	Red Vented Bulbul	<i>Pycnonotus cafer</i>	Passeriformes	Pycnonotidae	Saucer or Plate
4.	Common Kingfisher	<i>Alcedo atthis</i>	Coraciiformes	Alcedinidae	Burrow
5.	Common Myna	<i>Acridotheres tristis</i>	Passeriformes	Sturnidae	Cavity Nester
6.	Common Tailor Bird	<i>Orthotomus sutorius</i>	Passeriformes	Cisticolidae	Pendant
7.	House Sparrow	<i>Passer domesticus</i>	Passeriformes	Passeridae	Scrape
8.	Magpie Robin	<i>Copsychus saularis</i>	Passeriformes	Muscicapidae	Saucer or Plate
9.	Lesser Adjutant	<i>Leptoptilos javanicus</i>	Coraciiformes	Ciconiidae	Platform
10.	Dove	<i>Zenaida macroura</i>	Columbiformes	Columbidae	Cup
11.	Woodpecker	<i>Dyocopus pileatus</i>	Piciformes	Picidae	Cavity Nester
12.	Striated Grassbird	<i>Megalurus palustris</i>	Passeriformes	Locustellidae	Saucer
13.	Crow	<i>Corvus splendens</i>	Passeriformes	Corvidae	Platform
14.	Black-Breasted Weaver	<i>Ploceus benghalensis</i>	Passeriformes	Ploceidae	Pendant
15.	Great Egret	<i>Ardea alba</i>	Pelecaniformes	Ardeidae	Platform
16.	Parrot	<i>Psittacula alexandri</i>	Psittaciformes	Psittacidae	Cavity nester
17.	Baya Weaver	<i>Ploceus philippinus</i>	Passeriformes	Ploceidae	Pendant

Table 2: Biology of some common birds

Sl. no.	Local name	Body Size (cm)	Eggs/brood (no.)	Incubation period (in days)	Fledging period (in days)
1.	Bank Myna	20-24	4-5	13-15	20-22
2.	Pigeon/Rock dove	33	2	18	25-29
3.	Red Vented Bulbul	20	2-3	14	10-13
4.	Common Kingfisher	60-90	2-10	19-20	24-25
5.	Common Myna	23	4-6	17-18	22-24
6.	Common Tailor Bird	10-14	4	12	14
7.	House Sparrow	12-15	4	12	15-17
8.	Magpie Robin	17-20	3-6	12-15	14-21
9.	Lesser Adjutant	122-129	2-4	28-30	47-52
10.	Dove	31	3-4	14-15	11-15
11.	Woodpecker	40-49	4-6	12-16	18-35
12.	Striated Grassbird	22-28	-	-	-
13.	Crow	40	3-5	16-17	21-28
14.	Black-Breasted Weaver	15	3-4	-	-
15.	Great Egret	100	6	23-26	42-49
16.	Parrot	33-38	2-4	-	-
17.	Baya Weaver	15	2-4	14-17	17

1. BANK MYNA (*Aeridotheres ginginianus*)

It is a common bird. Colour is pale bluish grey; underside is lighter grey with pale pink plumage towards the centre of the abdomen, orange-red eye patches and short crest of dark bristly feathers on the forehead. The wing-patch and tip of tail feathers are pinkish buffs instead of white. The bill is short and strong, with shiny orange-yellow colour. Strong legs with shiny orange-yellow colour. The naked skin behind the eye is brick red.

Nesting behavior

The nest is a pad of grass, feathers and rubbish, stuffed in the widened chamber at the end of a horizontal earth tunnel. Eggs are glossy pale blue colour without markings and are laid

in a brood. Nesting and breeding season is from April to August. The nest is always built in earth walls, on the bank of rivers, embankments, sides of disused brick kilns, earthen walls, sides of open wells or even in masonry. Generally found amongst rocks, around human habitations, often near tea stalls and markets.

2. Pigeon (*Ectopistes migratorius*)

Commonly known as Pigeons, Rock Doves are often considered a nuisance city and farm bird. These birds have been associated with humans for thousands of years and are thought to have been the first domesticated bird, raised for meat by the ancient Egyptian. Pigeons have different

colour due to breeding by humans. Mating-breeding habits pairs are monogamous, often breeding in consecutive seasons for as long as both birds of a pair live. The breeding season of these birds can be whole year provided climate conditions allow. There seems to be slowing down during the winter months.

Nesting behaviour

The nesting habits of these birds are a bit unique. The male chooses a site in view of the female, selecting one stick and bringing it back, lays it in front of his mate. The female who stays at the nesting site accepts the sticks the male brings to her and places them underneath her. The nest of these birds can be found along building ledges, rafters, beams, and under bridges or inside barns. The nest is saucer shaped and made of straws and leaves. The female may sit on the nest a day or two before the first egg is laid. Both the parents incubate although female incubate during night.

3.Red vented Bulbul (*Pycnonotus cafer*)

It is a popular caged bird, native from Pakistan to south-west China. The upper parts and breast are scaled brown to black. The shiny blank head has a small crest. Buff-belly, white rump and upper tail coverts; under tail coverts are red. Brown black tail is white tipped. Sexes are similar. Juveniles are mostly brown; wing coverts, some flight feathers and tail feathers have buff. It prefers lower level residential, agricultural, and scrubland. This bird also resides in native forests.

Nesting behaviour

The nest is cup shaped constructed of twigs, rootlets, grasses and cobwebs. Two to five Eggs are pink and marked with large, irregular red-brown blotches. Eggs are incubated by female or both parents.

4. Common Kingfisher (*Alcedo atthis*)

This species has a typical short-tailed, dumpy bodied, large headed and long billed. It has a green-blue neck stripe, white neck blaze and throat, and a black bill with some red at the base. The legs and feet are bright red. Its bill is black, and the legs are also initially black. The flight of the kingfisher is fast, direct and usually low over the water.

Nesting behaviour

Like all kingfishers, the common kingfisher is highly territorial. The nest is in a burrow excavated by both birds of the pair in a low vertical riverbank, or sometimes a quarry or other cutting. The straight, gently inclining burrow is normally 60-90 cm long and ends in an enlarged chamber. The nest cavity is unlined but soon accumulates a litter of fish remains and cast pellets. Eggs are glossy white and incubated by both male and female during day and the female at night.

5. Common Myna (*Acridotheres tristis*)

Common myna is readily identified by the brown body, black hooded head and the bare yellow patch behind the eye. The bill and legs are bright yellows. There is white patch on the outer primaries and the wing lining on the underside is white. Both sexes are similar and are seen in pairs.

Nesting behaviour

They breed through much of the year depending on the location, building their nest in a hole in a tree or wall. Nesting materials used by mynas include twigs, roots, tow and rubbish. The common myna uses the nests of woodpeckers, parakeets, etc. and easily takes to nest boxes; it has been recorded evicting the chicks of previously nesting pairs by holding them in the beak and later sometimes not even using the emptied nest boxes. Common myna roosts communally throughout the year, either in pure or mixed flocks with jungle mynas, rosy starlings, house crows, jungle crows, cattle egrets and rose-ringed parakeets and other birds. The common myna is a hollow-nesting species; that is, it nests and breeds in protected hollows found either naturally in trees or artificially on buildings.

6. Common tailor bird (*Orthotomus sutorius*)

It is a brightly coloured bird, with bright green upper parts and creamy under parts. They have short rounded wings, a long tail, strong legs and a sharp bill with a curved tip to the upper mandible. They are wren-like with a long upright tail that is often moved around.

Nesting behavior

The breeding season is March to December peaking from June to August, coinciding with the wet season, although they can breed throughout the year. Although the name is derived from their nest construction habit, the nest is not unique. The nest is a deep cup, lined with soft materials and placed in

thick foliage and the leaves holding the nest have the upper surfaces outwards making it difficult to spot. The punctures made on the edge of the leaves are minute and do not cause browning of the leaves, further camouflage.

7. House Sparrow (*Passer domesticus*)

House sparrows may or may not be the most loved birds; they certainly are a part of our backyard bird watching experience. Male has a grey crown, whitish check, and black throat. The bill and breast are black in summer and in winter the bill is yellow and the breast is grey.

Nesting behavior

The nesting habit of house sparrows plays a significant role in the birds' life and activities. The nest building is done nearly year-round; and in spring and summer, they use the nest for raising young ones and up to four broods a season is raised. The nest can be located in any available place in buildings, trees, and birdhouses near human habitation. One can notice most of the nest building activity in spring just before breeding; and both male and female build the nest. Nest is spherical in shape and is made up of a coarse material on outside such as straw, twigs, paper, leaves, grasses, and any other available material; inside is lined with feathers or fine grasses. Female begins to lay eggs about one week after nest building begins and incubation is done by female. Both male and female feed the young, and after the young birds have fledged, the female begins the next brood.

8. Magpie Robin (*Copsychus saularis*)

The magpie robin is a small bird; have distinctive black and white body with a long tail that is held upright as they forage on the ground or perch conspicuously. They are common birds in urban gardens as well as forests. They are particularly well known for their songs. The magpie robin is found in open woodlands and cultivated areas often close to human habitations.

Nesting behaviour

Magpie robins breed mainly from March to July in India and January to June in south-east Asia. They nest in tree hollows or niches in walls or building, often adopting nest boxes. They line the cavity with grass. The female is involved in most of the nest building, which happens about a week before the eggs are laid, and also incubated by female. The nest is mostly seen close to the ground, hopping along branches or foraging in leaf litter on the ground with a cocked tail. Females spend more effort on feeding the young than males.

9. Lesser Adjutant

(*Leptoptilos javanicus*)

Once a widespread and common species, the lesser adjutant has undergone a rapid decline in numbers recently, and is now rare throughout its range. This very large stork has long legs, neck and beak, and an upright stance. It is dark grey to black on the wings and back, and white on the underside. The head and neck are naked and yellow, but red in breeding males. Juveniles are duller and less glossy with more down on the head and neck.

Nesting behaviour

The Lesser adjutant inhabits fresh and saltwater wetlands, including riverbeds, floodplains, swamps, forest pools, lakes and paddy fields. They are solitary except during the breeding season when they form loose colonies, never exceeding 20 nests in a single colony. Breeding season is November to January in north-east India. The nest is a large platform of sticks placed on a tall tree, and diameter is more than one meter and up to a meter deep. Eggs are white and rapidly soiled during incubation.

10. Dove (*Zenaida macroura*)

The dove is medium sized, slender, elliptical wings are broad, and the head is round. Its tail is long and tapered. The legs are short and reddish in colour; beak is short and dark, usually a brown-black hue. The wings have black spotting, and the outer tail feathers are white, contrasting with the black inners. The eyes are dark, with light skin surrounding them.

Nesting behaviour

The male congregates building materials like grass weed and twigs for the female to use in building the nest. Generally, nests are 5-25 feet above the ground, mostly in trees, and sometimes in shrubs, vines; or artificial construction or hanging flower pots. The female makes a loose structure enough to see through from the ground. A successful nest is used more than once (up to five broods) during breeding season. One can encourage doves to set up housekeeping in yard by providing a

nest itself. Sometimes they use the unused nests of other birds, or arboreal mammals.

11. Woodpecker (*Dyocopus pileatus*)

Woodpeckers are instantly recognizable by their unique behavior of pecking vertically on trees and poles. Wood peckers are primarily monogamous, though polygamous species do exist. Drumming can be used to advertise territory, alerts a potential partner to a specific tree hole or to sexually stimulate another woodpecker.

Nesting behaviour

The mating and nesting behavior of woodpeckers ranges from compassionate to violent. They are cavity nesters. They create their own nests by excavating wood from trees and rarely use nests from previous years, and both male and female involve in this activity. The excavation hole typically takes woodpeckers 10-28 days. Sometimes, the pair produces one hole for breeding and another for roosting later year.

12. Striated Grassbird (*Megalurus palustris*)

The striated grassbird is an 'Old World Warbler' and it is found in south-east Asia including. The noisy bird has a large conspicuous warbler with long grated tail, often sitting and calling exposed on tops of grasses, bushes and telephone wires. Note streaked crown and streaked upper breast. The special characteristic of the bird is the 'wing flapping'.

Nesting behaviour

The breeding season of these birds is January to March. Both male and female take

part in nest building. Nest building materials they used are grasses, straw, leaves, etc. They prefer open marshland and wet grassland, with stands of reeds.

13. Crow (*Corvus splendens*)

The house crow, also known as the Indian, grey-necked, Ceylon or Colombo Crow, is a common bird of the crow family that is of Asian origin but now found in many parts of the world. The forehead, crown, throat and upper breast are a richly glossed black, whilst the neck and breast are a lighter grey-brown in colour. The wings, tail and legs are black, and bill is thick.

Nesting behavior

Generally, they build nest on large trees with big crown, and sometimes on telephone for successful breeding. Occasionally, there are several nests in the same tree. Peak breeding period is from April to July. House crows roost communally near human habitations and often over busy streets.

14. Black-Breasted Weaver (*Ploceus benghalensis*)

It is also known as the Bengal weaver or black-throated weaver. The black-breasted weaver is a resident in the northern river plains of the Indian sub-continent.

Nesting behavior

The breeding season is from June to September. The males build an enclosed nest from reeds and mud, and visiting females select a mate at least partially based on the quality of the nest. Built-in reed beds in the

marsh, often moonj or kans with some of the growing reeds incorporated into the dome as support. At the 'helmet' stage of construction a quantity of wet mud or cow dung is daubed thickly along the edge, with bright coloured scarlet or orange flowers or flower petals incorporated; this might be a part of the courtship rituals and exercise a direct influence on the reactions of the visiting female.

15. Great Egret (*Ardea alba*)

It is also known as common egret, large egret or great white heron, is a large, widely distributed egret, with four subspecies found in Asia, Africa, the Americas and southern Europe. It has a slow flight, with its neck retracted. This is characteristic of herons and bitterns and distinguishes them from storks, cranes, ibises, and spoonbills, which extend their necks in flight. The great egret walks with its neck extended and wings held close.

Nesting behavior

The great egret builds tree nests in colonies close to water. It is generally a very successful species with a large and expanding worldwide. It adapts well to human habitation and can be really seen near wetlands and water bodies of water in urban and suburban areas. Great egret breeds in colonies in trees close to large lakes with reed beds or other extensive wetlands, preferably at height of 10-40 feet. The nest, made of sticks and lined with plant material, could be up to 3 feet. It is monogamous.

16. Parrot (*Psittacula alexandri*)

The most obvious physical characteristic is the strong, curved and broad bill; upper mandible is prominent, curves downward, and comes to a point. The head is large, with eyes positioned high and laterally in the skull, so the visual field of parrots is unlike any other birds. Without turning its head, a parrot can see from just below its bill tip, all above its head, and quite far behind its head. The predominant colour of plumage in parrots is green, though most species have some red or another colour in small quantities.

Nesting behavior

The Parrots are monogamous breeders. It nests in cavities, either tree hollows or cavities dug into cliffs, banks, or the ground. The parrot holds no territories other than their nesting sites. Many species use termite nests. The vast majority of parrots are, like this feral rose-tinged parakeet, cavity nesters.

17. Baya Weaver (*Ploceus philippinus*)

These are sparrow-sized and in their non-breeding plumage, both males and females resemble female house sparrows. They have a stout horn colour conical bill and a short square tail. Non-breeding male and female have dark brown streaked fulvous buff above, plain whitish fulvous below, eyebrow long and buff coloured. Breeding males have a bright yellow crown, dark brown mask, blackish brown bill, upper parts are dark brown streaked with yellow.

Nesting behavior

The breeding season is monsoon. They nest in colonies typically of 20-30, close to the source of food, nesting material and water.

Baya weavers are best known for the elaborately woven nests constructed by the males. These pendulous nests are retort-shaped, with a central nesting chamber and a long vertical tube that leads to a side entrance to the chamber. The nests are woven with a long strips of paddy leaves, rough grasses and long strips torn from palm fronds. A male bird is known to make up to 500 trips to complete a nest. The birds use their strong beaks to strip and collect the strands and weave and knot them while building their nests. Nests are often built hanging over water from palm trees and often suspended from thorny trees. Although the birds prefer thorny trees, nests are often located on the eastern side of the tree, where they are believed to provide shelter from the South-west Monsoon. Once a male and female are paired, the male goes on to complete the nest by adding the entrance tunnel.

DISCUSSION

Nest Site Selection

Selection of a safe nesting site is prime importance for successful breeding. Prior to construction, one or both of the parents must decide on the location in which to construct the nest. The selection of suitable nest site depends upon – (i) availability of food sources, (ii) the risk of predation, (iii) the presence and behaviour of conspecifics, (iv) availability of suitable nesting materials, and (v) the presence of suitable ambient climate for raising offspring. Ambient temperatures are usually lower than optimal temperatures for offspring development, and empirical studies show that

nests are located in sites that lose less heat sites selected at random. In contrast, in arid environments, animals select sites that are cooler than randomly selected sites. Most of the birds have been shown to choose their nest sites in order to reduce the risk of predation. Consequently, there is good evidence to suggest that birds vary the height at which they could build their nests in response to predators as they build their nests higher from the ground in response to mammalian predators and lower in response to avian predators.

Nest Construction Materials

Birds use many materials to construct their nests as they find available in their environments. Birds commonly use twigs and grasses are common, with mud used to cement them. Some swallow nests use solely for nest building. The lining of bird nest is often composed of much softer and more elegant than the outer shell. Materials such as fine grasses, horsehair, thistle-down, sheep's wool, spider webs, plant down, and feathers may grace the interiors. Most birds carry nest material to the nest site exactly as they carry their food; some carries it in their claws, and other species carry it in their bills. Nesting materials can generally be classified as being either structural materials or lining materials. The structural materials make up the general shape of the nest and provide structural support for the parents and offspring, while, lining materials generally creates a suitable microclimate in which parent can raise their

offspring. Some study suggests that structural materials provide thermoregulatory benefits.

CONCLUSION:

Based on the study it can be concluded that Sualkuchi area is one of the best breeding sites for various types of bird species. Awareness about this ecologically important species should be created among local people and efforts should be taken for the protection of nesting colonies. Besides nest-building, some other behavioural skills, like singing and dancing, may be under strong sexual selection. In weaver birds, limited evidence has been found for current female choice for attributes of nest architecture. In addition, historical question about the selective factors associated with the evaluation of nest architecture may be best answered using a comparative approach. The current female choice in weaver birds appears to be more closely related to nest location than to nest architecture. It is clear that there is significant overlap in the questions being addressed by researchers investigating nest construction in birds and that many of these questions, particularly regarding the fitness consequences of behavioural responses to changing environments, require urgent attention. Birds provide excellent models for scientific study of nest building; however, they are unlikely to be equally well suited for addressing all questions. Their terrestrial nesting habits, the possibility for tracking the survival and reproductive success of offspring in natural field conditions, and the existence

of long-term study sites, mean that birds are likely to prove better models for studying fitness consequences of variation in nest construction or nest structure.

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Lycopene content in different varieties of species of *Lycopersicon Esculentum*(Tomatoes) available in North Eastern States of India

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ABSTRACT :-Lycopene is a phytonutrient and an antioxidant which is responsible for the characteristic deep red colour of ripe tomatoes. Lycopene plays an important role in human health .Many epidemiological studies have shown it to reduce the risk of various chronic diseases. The lycopene content in different varieties of tomatoes from different parts of Assam and North East India was studied. Tomatoes were crushed and extracted then analysed for lycopene content by spectrophotometry. The absorbance was read at 472nm. The lycopene content ranged from (35.24to131.05) Micro gram/gram.Singimarilocal(hybride)having the highest and Barpeta local the lowest.Few percentage of lycopene may lost during extraction and at the time of analysis. The lycopene content in tomatoes and tomato based foods would be of interest to the food industries and tomato improvement and public health intervention programmes. This paper summeries the current state of knowledge of the properties of lycopene, and its possible health benefits.

Keywords:-Antioxidant, Carotenoids, Cooking, Cultivers, Phytonutrient

Introduction:-Tomatoes play an important and integral part of the human diet. Tomatoes are believed to be the second most consumed vegetables after potatoes [1].Although tomatoes are commonly consumed fresh, over 80% of tomato consumption comes from processed products such as tomato juice ,paste, puree, ketchup and sauce[2].Rao and Agarwal [3]in 1998 indicated the potential health benefits.Lycopene,a major carotenoid without pro vitamin A activity, present in red tomatoes is considered to be responsible for their beneficial effects[4].The ability of lycopene to act as a potent anti oxidant is thought to be responsible for protecting cells against oxidative damage and hence have capacities to decrease risk of various chronic diseases[5].

Tomatoes have been traditionally credited as rich sources of carotenoids and vitamins, particularly beta- carotene ,pro - vitamin A and ascorbic acid[6]. Lycopene is a phytonutrient and a potent anti- oxidant,it is also a naturally occurring carotenoids responsible for the deep red colour in tomatoes, watermelons and pink grapes[7].The molecular formula of lycopene is $C_{40}H_{56}$,having 11 conjugated double bonds making it a highly unsaturated compounds. Though it is used as a food colourant since many years it is only recently that it has been the subject of intense study with respect to its anti oxidant activity and potential protective effect in alleviating some chronic diseases such as certain cancer and Coronary heart diseases[8].In turn this situation has led to the idea of increasing level of lycopene in crops ,particularly in tomatoes by genetic crosses or genetic manipulation. As we put interest in some previous studies it is seen that in fresh tomatoes,the content of lycopene was reported to range from 25 to 2000 Micro gram/gm in raw tomatoes[9].The level of lycopene is directly related to ripeness and increasing pH [10].The health benefits of lycopene in tomatoes is an important sources of food in Assam and the North eastern states of india.

Materials and Methods:-

Lycopene extracts from tomato is prepared from ripe fruits of tomatoes (*Lycopersicon Esculentum*). Tomato samples were collected from various parts of Assam and Northeastern region such as singimari, Barpeta , Kharupetia, Shilong, Ramdia,

Goureswar and from local markets. The lycopene content were determined as similar as to the method taken by *sadleret.al*[11]. The raw tomato samples was separated into portions weighing 5-10 grams each in a porcelain basin or test tube. It is covered with aluminium foil to protect from sunlight. The samples were cooled at room temperature and used to determine lycopene content.

The raw samples were crushed in Mortar the crushed tomato were extracted with n hexane and acetone (2:1). The mixture were shaken and water content is separated by adding Na_2SO_4 . Now the organic layer is separated. The hexane phase finally collected and were taken in 25 ml flask and optical density of the hexane extract were determine spectrophotometrically. The model of spectrophotometer used is "Carry 60". Lycopene is determined in between the range 450-500 nm. The concentration of lycopene was calculated the loss of lycopene compared with control are also calculated. During calculation extinction co-efficient (E%) of 3150 is used. All analysis were carried out in triplicate from each of three replications.

Result and Discussion :- The lycopene content of the raw tomatoes were analysed. The lycopene content ranged from 35.24 $\mu\text{g/g}$ to 131.05 $\mu\text{g/g}$ on a fresh weight basis. This is comparable to values reported for fresh tomatoes (20.4 to 114 $\mu\text{g/g}$) by *George etal* (2004)[8]. Significant difference were observed in lycopene content and R_1 (Ramdia local) has lowest (35.39 $\mu\text{g/g}$) and G_5

(Goureswar) local has the highest lycopene content (131.05 µg/g) the variation in the lycopene content of tomato obtained from different parts of North Eastern region of India is probably due to differences in their growing conditions, cultivar and ripening stage of tomatoes. These factors could account for the variation in the lycopene level reported in different studies Thomson *et.al* 2000[10] and Takeoka *et al* 2000[9]

UV Visible Spectrum of four samples are given below ::

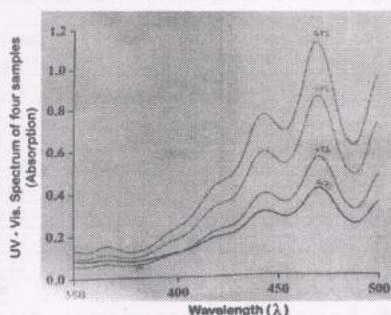


Table 1

Lycopene content (µg/g) in 20 varieties of tomato (*Lycopersicon esculentum*)

Sl. NO	Varieties	Raw (µg/g)
1	S ₁ (Singimari local)	92.58
2	S ₂ (Singimari local)	98.21
3	S ₃ (Singimari local (hybride))	115.02
4	B ₁ (Barpeta local)	74.05
5	B ₂ (Barpeta local)	81.75
6	B ₃ (Barpeta local, hybride)	92.08
7	R ₁ (Ramdia local, small)	35.39
8	R ₂ (Ramdia local, medium)	69.23
9	R ₃ (Ramdia local, hard)	41.28
10	K ₁ (Kharupetia local)	94.38
11	K ₂ (Kharupetiahybride)	100.05
12	K ₃ (Kharupetiahybride)	112.09
13	Sh ₁ (Shillong local)	55.29
14	Sh ₂ (Shillong local)	74.28
15	Sh ₃ (Shillonghybride)	115.35
16	G ₁ (Goureswar local)	71.28
17	G ₂ (Goureswar local)	65.03
18	G ₃ (Goureswar, small)	79.29
19	G ₄ (Goureswar big, hybride)	125.15
20	G ₅ (Goureswarhybride)	131.05

Table 2

Percentage of loss of lycopene in some varieties:-

Sl. No	Varieties	Raw	Loss after 1h, µg/g
1	S ₁		11.78
2	S ₂		15.28
3	B ₃		12.29
4	R ₃		18.21
5	K ₃		20.15
6	Sh ₃		16.02
7	G ₁		10.38
8	G ₅		15.21

Health benefits of lycopene:- Several epidemiological studies have indicated a beneficial effect of tomato consumption in the prevention of some major chronic diseases such as various types of cancer and cardiovascular disease [11&12s]. One of the major phytochemicals in tomato products contributing to the prevention of cancer is lycopene. Lycopene has shown distinct antioxidant and anticarcinogenic effects in all cellular levels and definitely contributes to the health benefits of consumption of tomato in diet. Consumption of naturally occurring carotenoid rich fruits and vegetables particularly tomato and tomato products containing lycopene should be encouraged with positive implications in health and disease.

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Hexagon

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