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A survey on macrophytic flora growing on ancient monuments of Sivasagar district, Assam

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SUMMARY

Sivasagar, one of the Assam's oldest cities, was once regime of Ahoms for approximately six centuries. The present paper deals with the growth of macrophytes on the ancient monuments of Sivasagar, District Assam. A total of 66 species had been collected out of which 57 (of 23 families) are angiosperms (46 dicot and 11 monocot); 7 (of 6 families) pteridophytes and 2 species are bryophytes. the highest number of species was collected from Fakuwa Dol (53) and Golakghar, Gargaon (43), respectively.The Shannon diversity and equitability or evenness at Fakuwa dol or Jaymoti dol is 2.04 and 1.18 followed by Golak ghar which is about 1.5 and 0.92, respectively and is less at the Ranghar and is about 0.45 and 0.06, respectively. These monuments should be conserved or renovated because of its design and craftmanship, which show a past architectural style.

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Key words : Sivasagar, Monuments, Ahoms, Plant diversity, Conservations

Assam, the "Shangri – La" of the North – Eastern India is a melting pot where races like Indo – Tibetan, Mongoloian, Aryans, etc. dawn from diverse hive at different points of time were synthesizes and transformed into colourful Assamese people, such perfect fusion of culture and heritage gave birth to Assamese culture.

Sivasagar, is one of the Assam's oldest cities, remained the seat of Ahom regime for approximately six centuries whose first king, Sukapha, migrating from, Mong – Mao or Mong – Mao Ling (South – west Yunnan province in China) had first established his first capital at Charaideo in 1261 A.D. There are several historical monuments, which were constructed by Ahoms in between 1228 A.D. and 1826 A.D. such as Rang Ghar, Kareng Ghar, Talatal Ghar, etc. expressing engineering marvels of the past and have a great importance in the history of Assam as well as of India, which provides information's regarding the civilizations, art and culture, etc. of the past. These monuments are spread all over the district, which comprises of three subdivisions *viz.* Sivasagar, Charaideo and Nazira. It is believed that Ahoms were great builders. Their buildings activities spread far and wide beyond the limit of the political boundary of Sivasagar district. But with the passage of time, most of the monuments are in dilapidated conditions due to the deteriorations of stones (Biodeteriorations), which are enhanced by the mineralogical and physical characteristics and their varying, weathering responses under different climatic and environmental conditions (Kumar, R. and Kumar, A.V. 1999) that favours the growth of various macrophytic floras.

Biodeterioration can be defined as the irreversible loss of value and/or information of an object of art following the attack by living organisms (Urzi and Krumbein 1994). The environmental factors such as high temperatures, high relative humidity levels and heavy rainfall, wind, sunlight and pollution favours the growth and sustenance of a wide variety of living organisms on the stone surfaces from bacteria to higher plants.These agents cause an increase in the surface area of stone by the formation of micro and macro-fissures or formation of encrustations. When the surface of the monument has undergone this process of alternation, living organisms begin to colonize the area. The growth of higher plants over monuments and historic buildings is one of the major problems faced by conservators especially in tropical

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countries (Almedia, *et.al.* 1994). These plants have been reported to cause physical as well as chemical damage (Mishra *et.al.* 1995), as they provide unique niche for the growth of different communities. Therefore the present work deals with the diversity of macrophytic flora growing on the ancient monuments of Sivasagar district. Understanding the diversity would help in formulating proper conservation strategies of the monoumnts.

MATERIALS AND METHODS

Study area:

Sivasagar district lies between $94^0$4'and $95^0$2' E Longitude and $26^0$5' and $27^0$1' N Latitudes and is situated at about 80m above the sea level. It is bounded by Arunachal Pradesh in the North, Arunachal Pradesh in the East, Nagaland in the South and Jorhat district in the West. The river Brahmaputra flows along the north-western boundary of the district. The region experiences four distinct seasons *viz.,* spring, summer, autumn and winter. The region enjoys a tropical climate which receives annual rainfall ranges from 2500mm – 4500mm and the temperature ranges between 10^0C – 37^0C.

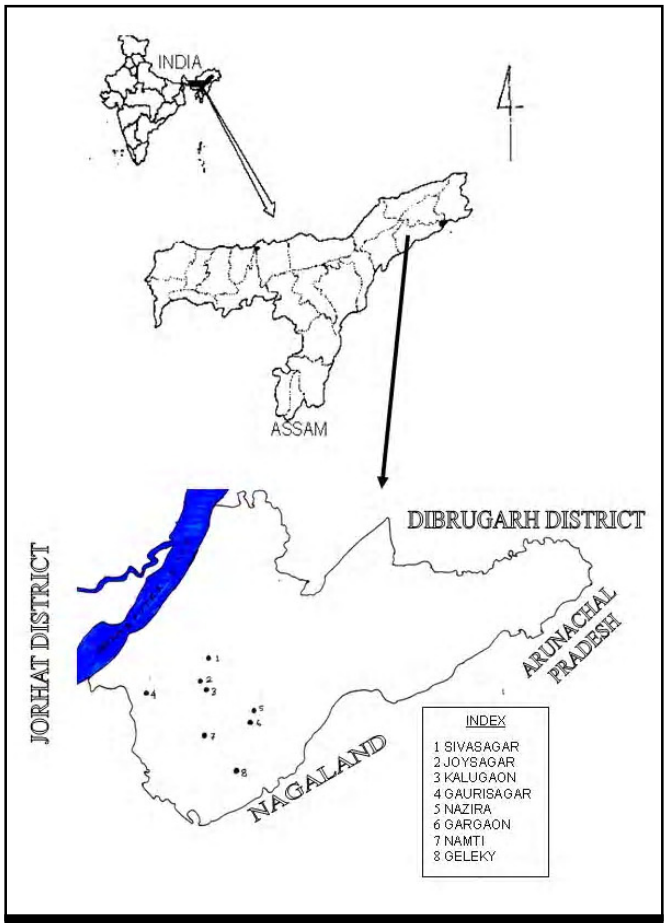

Fig. 1 : Map of Sivasagar District showing the distribution of studied monouments

We surveyed 24 monuments in 8 different sites of the district in different seasons during the years 2007 – 2009. Plant specimens were collected and identified with the help of existing flora and the Herbaria of Department of Botany, Gauhati University. The specimens were preserved in Herbarium of Botany Department, Gargaon College, Sivasagar, Assam. Shannon diversity index (Shannon Weiner 1963), Evenness index (Pielou 1966) and Similarity index (Sorsen 1948) was calculated as follows:

Shannon's diversity index:

$$H = -\sum_{i=1}^{S} p_i \ln p_i$$

where, H = Shannon's diversity index, S = Total number of species at the site (richness), p_i = Proportion of *S* made up of the *i*th species and ln p_i = logarithm of Proportion of *S* made up of the *i*th species.

Evenness index:

$$e = H/\ln S$$

where, H =. Shannon's diversity index, S = Total number of species at the site.

Similarity index:

$$\frac{2C}{A+B} \times 100$$

where, C = Common species between two site
A = Total no. of species in site A
B = Total no. of species in site B

RESULTS AND DISCUSSION

In the present study a total of 66 species have been collected out of which 57 (of 23 families) are angiosperms (46 dicot and 11 monocot); 7 (of 6 families) are pteridophytes and 2 species are bryophytes. On the basis of percentage of occurrence dicotyledonous were found to be most dominants *i.e.* 69 % and bryophytes were fewer *i.e.* 3% only, while monocotyledonous were 17% and pteridophytes represents 11%, respectively. Among the angiosperms, Poacaeae with 10 species (19%) dominate all the sites; followed by Asteraceae 7 (12%), Amaranthaceae and Oxalidaceae 4 species (7%); Apiacaeae, Moracaeae, Papilionaceae and Rubiaceae with 3 species (6%); Convolvulaceae, Euphorbiaceae, Lamiaceae, Piperaceae, Scrophulariaceae and Urticaceae with 2 species (4%); and Acanthaceae, Brassicaceae, Carryophyllaceae, Cyperaceae,

Table 1 : Species richness, diversity and evenness index of plant species at different study sites

Sr. No.	Name of the monuments	Locations	No of species	No of families	Shannon diversity index (H)	Evenness index (e)
1.	Kareng Ghar	Sivasagar	12	9	0.94	0.87
2.	Bishnu dol	Gaurisagar	8	6	0.67	0.74
3.	Siva dol	Gaurisagar	6	6	0.67	0.74
4.	Devi dol	Gaurisagar	10	8	0.83	0.83
5.	Bishnu dol	Joysagar	10	8	0.56	0.56
6.	Devi dol	Joysagar	10	8	0.86	0.86
7.	Golakghar	Sivasagar	*43*	*23*	*1.50*	*0.92*
8.	Golakghar	Gargaon	8	7	0.81	0.89
9.	Ahom Palace	Gargaon	6	5	0.45	0.06
10.	Ranghar	Sivasagar	17	15	1.18	0.96
11.	Ranganath dol	Sivasagar	8	7	0.82	0.91
12.	Siva dol	Joysagar	8	7	0.79	0.87
13.	Jai dol	Joysagar	8	7	0.80	0.89
14.	Bishnu dol	Sivasagar	8	7	0.77	0.85
15.	Devi dol	Sivasagar	8	7	0.49	0.54
16.	Siva dol	Sivasagar	8	7	0.82	0.91
17.	Fakuwa dol	Sivasagar	*53*	*28*	*2.04*	*1.18*
18.	Hargauri dol	Joysagar	8	7	0.56	0.62
19.	Bishnu dol	Geleky	8	7	0.79	0.87
20.	Maheswar devaloi	Nazira, Nomati	8	7	0.81	0.89
21.	Siva dol	Kalugaon	8	7	0.78	0.86
22.	Bishnu dol	Namti	8	7	0.80	0.89
23.	Devi dol	Namti	8	7	0.75	0.83
24.	Gorakhiya dol	Nazira	8	7	0.77	0.85

Plumbaginaceae, Polygonaceae, Rosaceae, Solanaceae and Staphyleaceae each with 1 species (2%). Among pteridophytes Thelypteridaceae with 2 species (30%), Adiantaceae, Ophiglossaceae, Pteridaceae, Lygodiaceae and Sellaginellaceae with 1 species (14%) each dominated the sites. Highest number of species was collected from Fakuwa Dol (53) and Golakghar, Gargaon (43), respectively. The Shannon diversity and Evenness index is highest at Fakuwa dol (2.04 and 1.18) followed by Golak ghar (1.5 and 0.92) and it is less at the Ranghar (0.45 and 0.06), respectively (Table 1). During the survey, it was found that the species *Adiantum philippense, Ficus religiosa, F. rumphii, Pteris vitta, Imperata cylindrica, Macrothelypteris sp., Marchantia sp.,* Mosses and *Peperomia pelusida* are highly abundant in all the sites (Table 2). These species had characteristic of having light weight seeds which are easily dispersed by wind to the surfaces of the monuments and also due to the dampness of the monument walls, these seeds get easily established in the surfaces. Except *Ficus* sp., *Imperata cylindrical* and *Pteris vittata* the other species are shade and moisture loving. Further all these species get easily established on the monuments due to the rough surface of the monuments and fissures that had created due to old age. Besides, the nature and properties of stones, bioreceptivity of the material (Guillite, 1995), environmental factors (both macro and micro) such as tempertaure, relative humidity, light condidtion, wind and rainfall determine the growth of macrophytes on the monuments. Among these the water seems to be the most important factor for the growth of macrophytes on the walls of the monuments (Camuffoa, 1986, Canevaa *et al.,* 1992 and Uchidda *et al.,* 2000). The availabiltiy of the water, be it in any form is directly related to the macrophytic cover on the historical monuments. The region also receives abundant precipitation throught the year due to tropical climate that favours the luxurious growth of macrophytes on the monuments. The growth of these species on the monuments does not take place in minutes, hours or days; it is a very long successional process. This process resulted in both physio – chemical and mechanical weathering of the monument surfaces

Table 2 : Distribution and abundance of species at different study sites

Sr. No.	Name of the species	Family	Monouments																								
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1.	*Adiantum philippense* L.	Adiantaceae	+	-	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2.	*Ageratum conizoides* L.	Asteraceae	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-
3.	*Alternanthera sessilis* (L.) R. Br. ex. Dc.	Amaranthaceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
4.	*Alysicarpus vaginalis* Wall.	Papilionaceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
5.	*Amaranthus persicarioides* Spreng.	Amaranthaceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
6.	*Amaranthus spinosus* L.	Amaranthaceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
7.	*Amaranthus viridis* L.	Amaranthaceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
8.	*Borreria articularis* (L.f.) F.N.Will	Rubiaceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
9.	*Centella asiatica* (L.) Urban	Apiacaeae	+	-	-	-	-	-	+	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-
10.	*Chromolaena odorata* (L.) Voigt.	Asteraceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
11.	*Crotolaria macrophylla* Willd.	Papilionaceae	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-
12.	*Cyanodon dactylon* (L.) Pres.	Poacaeae	+	-	-	-	-	-	+	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-
13.	*Cyperus rotundus* L.	Cyperaceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
14.	*Desmodium triflorum* DC.	Papilionaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
15.	*Digitaria longiflora* (Retz.) Pres.	Poacaeae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
16.	*Drymaria cordata* (L.) Willd. ex. R and S	Carryophyllaceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
17.	*Eclipta alba* Hassk.	Asteraceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
18.	*Eleusine indica* Garten.	Poacaeae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
19.	*Eragrostis sp.*	Poacaeae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
20.	*Eragrostis unidoides* (Retz.) Nees.	Poacaeae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
21..	*Eragrostis* sp.	Poacaeae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
22.	*Eurphorbia hirta* L.	Euphorbiaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
23.	*Evolvous nummularius* L.	Convolvulaceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
24.	*Ficus lepidosa* L.	Moracaeae	-	+	-	+	+	+	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25.	*Ficus religiosa* L.	Moracaeae	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
26.	*Ficus rumphii* Bl.	Moracaeae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27.	*Frageria* sp.	Rosaceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
28.	*Hedyotis corymbosa* L.	Rubiaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
29.	*Hydrocotyle sibthorpioides* Lamk.	Apiacaeae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
30.	*Hydrocotyle japonicum* Hirae	Apiacaeae	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-
31.	*Imperata cylindrica* L.	Poacaeae	+	+	+	+	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+
32.	*Lecuas plukentii* (Rotb.) Spring	Lamiacaeae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
33.	*Leonarus sibricus* L.	Lamiacaeae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
34.	*Lygodium* sp.	Lygodiaceae	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35.	*Macrothelypteris* sp.	Thelypteridaceae	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
36.	*Macrothelypteris ornate* (Wall ex. Bedd.) Ching	Thelypteridaceae	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
37.	*Marchantia* sp.	Marchantiaceae	+	-	-	+	+	+	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
38.	*Mikenia micrantha* Kunth e.x. HBK	Asteraceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39.	Mosses	Brydiae	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
40.	*Nasturtium indicum* L.	Brassicaceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
41.	*Ophioglossum reticulata* L.	Ophioglossaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
42.	*Oxalis corniculata* L.	Oxalidaceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
43.	*Oxalis debilis* var.*corymbosa* (DC.) Lour	Oxalidaceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-

Contd…. Table 2

Table 2 contd….

44.	*Oxalis latifolia*	Oxalidaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
45.	*Oxalis terniflora*	Oxalidaceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46.	*Paspalum compactum*	Poacaeae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
47.	*Paspalum sanguinale* Lamk.	Poacaeae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
48.	*Peperomia heynena* Miq.	Piperaceae	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
49.	*Peperomia pellucida* (L.) HBK.	Piperaceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50.	*Perthanium hystophorus*	Asteraceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
51.	*Plumbago zeylanica* L.	Plumbaginaceae	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52.	*Pouzolzia indica* Gaud.	Urticaceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
53.	*Pteris vittata* L.	Pteridaceae	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
54.	*Randia spinosa* (L. f.) Poir.	Rubiaceae	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
55.	*Ricinus communis* L.	Euphorbiaceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
56.	*Rumex acetosa* L.	Polygonaceae	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
57.	*Rangia parviflora* (Retz.)Nees.	Acanthaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
58.	*Scoparia dulcis* L.	Scrophulariaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
59.	*Sellaginella* sp.	Selaginallaceae	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
60.	*Setaria italica* Beauv..	Poacaeae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
61.	*Solanum torvum* (Sw.) Prodr.	Solanaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
62.	*Spilanthes paniculata* Dc.	Asteraceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
63.	*Turpinia pomifera*	Staphyleaceae	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
64.	*Urtica ardens* Link.	Urticaceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
65.	*Vernonia cineria* L.	Asteraceae	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
66.	*Vendellia crustacea* Benth.	Scrophulariaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-

'+' present; '-'absent

Table 3 : Similarity index of species occurrence among the study sites

Sites	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	100	50	60	80	80	80	110	70	50	90	70	70	70	70	70	120	70	70	70	70	70	70	70	70
2		100	71.4	100	100	100	100	85.7	71.4	85.7	85.7	85.7	85.7	85.7	85.7	85.7	85.7	85.7	85.7	85.7	85.7	85.7	85.7	100
3			100	87.5	87.5	87.5	87.5	87.5	62.5	75	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	75
4				100	100	100	100	100	60	80	80	80	80	80	90	80	80	80	80	80	80	80	80	80
5					100	100	100	80	60	80	80	80	80	80	90	80	80	80	80	80	80	80	80	80
6						100	37.7	30.2	22.6	30.2	30.2	30.2	30.2	30.2	30.2	34	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2
7							100	30.2	22.6	34	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.0	30.2	30.2	30.2
8								100	85.7	100	114	114	114	114	114	114	114	114	114	114	114	114	114	114
9									100	52.2	52.2	52.2	52.2	52.2	52.2	52.2	52.2	52.2	52.2	52.2	52.2	52.2	52.2	52.2
10										100	56	56	56	56	56	93	56	56	56	56	56	56	56	56
11											100	32	32	32	32	32	32	32	32	32	32	32	32	32
12												100	32	32	32	32	32	32	32	32	32	32	32	32
13													100	32	32	32	32	32	32	32	32	32	32	32
14														100	32	32	32	32	32	32	32	32	32	32
15															100	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2
16																100	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2
17																	100	100	100	100	100	100	100	100
18																		100	100	100	100	100	100	100
19																			100	100	100	100	100	100
20																				100	100	100	100	100
21																					100	100	100	100
22																						100	100	100
23																							100	100
24																								100

that creates cracks on walls and distorts the structure and durability of monuments.

Conservation strategies:

These monumens should be conserved or renovated because of its design and craftmanship, which show a past architectural style. Besides this, they repesent the achivements and traditions of our past communities. The conservations or the renovations of the archaeological mouments are necessary for its, archaelogical, architectural, social and as well as economical importance.

Conservations of historical monuments require an accurate study of the environemtal agents which causes the deterioations. Beside this, past history of the monuments is also important (Camuffoa 1986). There are number of ways by whch we can improve/renovate or conserve the historical monuments for the present and future generations to understand, such as, regular cutting and crushing of the fronds should be taken at least twice in a year, so that the regrowth of the macophytes can be checked, cracks should be repaired immediately so to stop the roots of woody plants penetrating them. Herbicides, should be sprayed in extreme cases but due care should be taken so that it doesnot damges the wall of the monuments.

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