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Grass species population studies in freshwater pools of Sivaganga District, South India with different land-use

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Introduction

Vernal pools are seasonal wetlands which fill with water in the rainy season and dry down in the spring and remain desiccated throughout the summer. These extreme conditions create a unique ecosystem that supports high species diversity (King *et al.* 1996). Ephemeral water pools have recently received more attention where studies have monitored the vegetation dynamics as the system shifts from an aquatic and terrestrial environment (Gopal and Junk 2000; Pott *et al.* 2010). Landscape changes are considered important on the biodiversity aggregation of meadows (Monterio *et al.* 2013). The present study was carried out to analyze grass vegetation diversity of the desiccate ephemeral fresh water pools with different land-use patterns.

Methods

Experimental site description

The present work was carried out in three different ephemeral pools *viz.*, Periyakollukudipatty (PKPTY), Chinnakollukudipatty (CKPTY) and Vettangudipatty (VTDGI) drainage pools are located very close to each other in Kollukudipatty and Vettangui villages of Sivagangai District, Tamil Nadu, India. Sub-tropical and semi-arid eco-climatic condition is prevalent there, with a mean annual rainfall range of 450-600 mm. These pools become aquatic in nature during rainy monsoon between the months of October and November, and the water residence period ranges between 4-5 months. At this time there is an occurrence of a large number of migratory birds at the PKPTY pond which is well protected as Birds Sanctuary and offers eco-tourism value. As well, the pond serves to fulfil the irrigation and domestic needs of the local communities. Cattle ranching is commonly found in CKPTY and VTDGI.

Vegetation analysis

Vegetation analysis was done using quadrat study (1 m x 1 m size), established in the experimental pools at different points randomly chosen at the water entry points, near the shutters, deep and shallow regions at the dry pond surfaces. Bund vegetation was also analyzed simultaneously. Vegetation data was analyzed to calculate Shannon's diversity index, evenness and cluster analysis was done for the analyzed diversity values separately for desiccate surface and bund areas' vegetation.

Results and Discussion

Grass composition and diversity indices of species varied among the two different sampling points of three experimental sites (Tables 1 and 2). Evenness of the three sites

Table 1. Summarized results of grass vegetation occurred at the experiment pools' desiccate surface

Grass Species occurred	Shannon's Index			Evenness		
	PKPTY	CKPTY	VTDGI	PKPTY	CKPTY	VTDGI
Apluda mutica	0.00	0.00	1.54	0.00	0.00	5.00
Aristida setaceae	0.00	0.00	1.64	0.00	0.00	0.92
Brachiaria distachia	0.68	0.00	0.00	0.62	0.00	0.00
Chloris barbata	0.00	1.21	0.00	0.00	0.87	0.00
Cyandon dactylon	1.85	2.42	1.64	0.89	0.98	0.91
Cyperus rotundus	1.81	0.00	0.00	0.93	0.00	0.00
Dactyloctenium aegypticum	0.00	1.44	1.66	0.00	0.67	0.93
Echinocola colona	0.52	0.00	0.00	0.42	0.00	0.00
Sporobolus nigrescens	1.99	0.00	0.00	0.90	0.00	0.00

Table 2. Summarized results of grass vegetation occurred at the bunds of the experimental pools

Grass Species occurred	Shannon's Index			Evenness		
	PKPTY	CKPTY	VTDGI	PKPTY	CKPTY	VTDGI
Apluda mutica	0.637	0.692	00	0.918	0.99	00
Aristida hystrix	00	00	0.683	00	00	0.985
Brachiaria distachia	00	1.009	00	00	0.919	00
Chloris barbata	00	1.256	0.673	00	0.906	0.971
Cyanodon berberii	00	00	0.483	00	00	0.696
Cyanodon dactylon	0.669	00	00	0.965	00	00
Cyperus rotundus	1.018	00	00	0.927	00	00
Dactyloctenium aegypticum	00	0.731	00	00	0.666	00

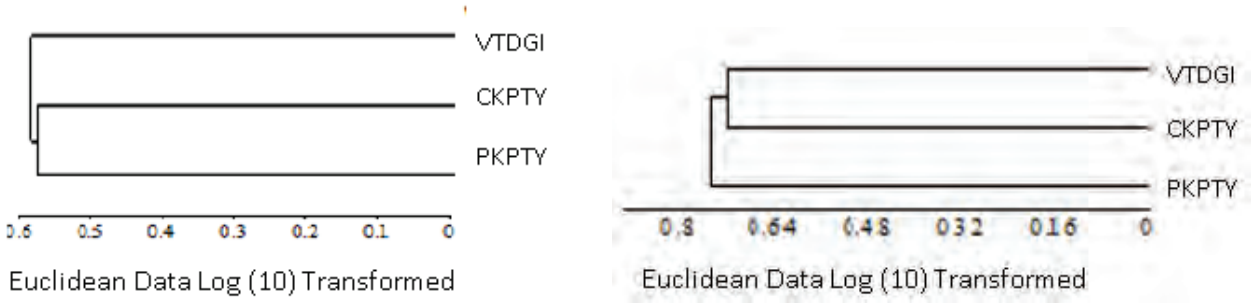

Figure 1. Dendrogram showing the extent of similarity among the desiccate ponds' A) Surface and B) Bunds on Grass Vegetation Diversity.

varied moderately. Dendrograms on the cluster analysis revealed that the experimental ponds of VTDGI and CKPTY are similar in their desiccate surface grass species diversity index than the PKPTY pond (Fig. 1A); however, PKPTY and CKPTY pools are more related with their bunds vegetation than is the VTDGI pond (Fig. 1B).

The variation in the grass species composition in the closely situated experimental ponds could be attributed due to the biotic influences and the utility nature of the experimental pools. In PKPTY, the pool surface has the heavy influence of an avian population which could account for the difference in the physical and chemical nature of the surface, which in turn, accommodates a different herbaceous community.

Conclusion

Temporal variations and the influence of biotic disturbances cause the grass species aggregation. A better understanding of the role of landscape context on the dynamics of plant diversity is important for framing management practices.

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