FLORISTIC AND PHYTOSOCIOLOGICAL STRUCTURE IN AN URBAN FRAGMENT OF THE ATLANTIC FOREST UNDER DIFFERENT HYDROMORPHIC CONDITIONS

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ABSTRACT: Environmental filters affect the establishment, development, distribution and diversity of the tree community in forests. In this sense, the aim of this study was to investigate how soil hydromorphic conditions influence the structure and floristic diversity of a fragment of Mixed Alluvial Ombrophilous Forest at different water tables in an urban area in the municipality of Guarapuava-PR, Brazil. For this, 72 sampling subunits of 10 x 10 m (100 m^2) were allocated, in each plot the Diameter at Breast Height (DBH ≥ 5 cm) of the trees were measured to calculate the phytosociological descriptors and ecological indices. The discriminant analysis detected four distinct groups in relation to the water table position. The study units of group 1, constitute areas of drained soil, group 2, intermediate characteristics, group 3, saturated soils and group 4, hydromorphic areas. The hydromorphic areas showed lower floristic diversity and higher species dominance, mainly *Gymnanthes klotzschiana*, *Matayba elaeagnoides* and *Ligustrum lucidum*. There is a difference in the composition of vegetation in relation to hydromorphic conditions. The closer to the river, the vegetation tends to show less diversity and certain species become dominant, decreasing competition, but increasing the number of individuals.

KEYWORDS: Environmental Filters; Groundwater Level; Alluvial Mixed

Ombrophilous Forest, Water Gradient.

FLORÍSTICA E ESTRUTURA FITOSSOCIOLÓGICA EM FRAGMENTO URBANO DE FLORESTA ATLÂNTICA SOB DIFERENTES CONDIÇÕES HIDROMÓRFICAS

RESUMO: Filtros ambientais condicionam o estabelecimento, desenvolvimento, distribuição e diversidade da comunidade arbórea nas florestas. Neste sentido, o objetivo deste estudo foi investigar como as condições hidromórficas do solo influenciam a estrutura e a diversidade florística de um fragmento de Floresta Ombrófila Mista Aluvial em diferentes níveis freáticos, em uma área urbana no município de Guarapuava-PR, Brasil. Para isso, foram alocadas 72 subunidades amostrais de 10 x 10 m (100 m^2), em cada parcela foram mensurados Diâmetro a altura do peito (DAP ≥ 15,7 cm) das árvores para calcular os descritores fitossociológicos e índices ecológicos. A análise discriminante detectou quatro agrupamentos distintos em relação a posição do nível freático. As unidades de estudo do grupo 1, constituem áreas de solo drenado, o agrupamento 2, características intermediárias, o agrupamento 3, solos saturados e o agrupamento 4, áreas hidromórficas. As áreas hidromórficas apresentaram menor diversidade florística e maior dominância de espécies, principalmente *Gymnanthes klotzschiana*, *Matayba elaeagnoides* e *Ligustrum lucidum*. Existe diferença na composição da vegetação em relação as condições de hidromorfia. Quanto mais próximo ao rio a vegetação tende a apresentar menor diversidade e determinadas espécies passam a ser dominantes, diminuindo a concorrência, porém aumentando o número de indivíduos.
PALAVRAS-CHAVE: Filtros Ambientais; Nível freático; Floresta Ombrófila Mista Aluvial; Gradiente Hídrico.

1 I INTRODUCTION

The alluvial environments of the Mixed Ombrophylous Forest (MAOF) correspond to tree formations in adjacent areas close to rivers, lakes, wetlands and hydromorphic zones. They are fragile ecosystems, of high ecological complexity, but fundamental for the process of geomorphological and environmental stability, in addition to the preponderant role in the formation of biological corridors and the maintenance of biodiversity. As well, they present peculiar characteristics in relation to the floristic composition, resulting from the connection between the soil water volume, water table depth, oxygen availability, flood pulses and a soil water gradient (MARTINS BASSACO; NOGUEIRA, 2019).

In this type of forest, the interaction between soil conditions and moisture shapes the biotic community, generating environmental filters (HALASSY et al., 2016), which correspond to interactions between species and disturbances inherent to the environment and that influence these species affect their ecosystem functions, especially in the processes of colonization, exclusion and dissemination within the community. These filters, such as water stress or hypoxia, narrow the range of possible ecological strategies caused by restrictive environmental conditions, creating a bottleneck where, in some cases, only species that are tolerant and adapted to these disturbances manage to coexist and remain in the

community structure. Thus, resulting in the predominance of a forest typology adapted to a given condition. Thus, admitting the recognition of floristic and phytosociological patterns of natural forests based on environmental gradients (OLIVEIRA et al., 2019).

Considering the importance of environmental conditions knowledge, such as hydromorphic variables together with spatially structured biotic factors on the composition and diversity of tree species, studies that quantify the influence of environmental variables on alluvial forest ecosystems ae important, as they allow a greater understanding of the processes of floristic-structural organization in terms of flood regimes, since scientific research in alluvial areas has been little explored (MILANI et al., 2021).

Thus, the present study aimed to investigate how different hydromorphic conditions affect the structure and floristic diversity in a forest community in a fragment of Mixed Alluvial Ombrophilous Forest in the municipality of Guarapuava-PR, Brazil.

2 | MATERIAL AND METHODS

The study area is comprised of an 11.5 ha fragment of Mixed Alluvial Ombrophilous Forest (MAOF), located in the CEDETEG Campus of the State University of the Center-West (UNICENTRO) (Figure 1), in Guarapuava, Paraná, Brazil. The area is delimited by the Cascavelzinho River (Cascavel River Hydrographic Basin - CRHB), at an altitude varying between 1000 and 1020 meters s.n.m. The climate is classified as Subtropical Mesothermal Humid (Cfb). The predominant soil classes in the study area are the Bruno Latosols, which are deeper and more structured, and the hydromorphic ones with an alluvial influence (RODRIGUES et al., 2016).

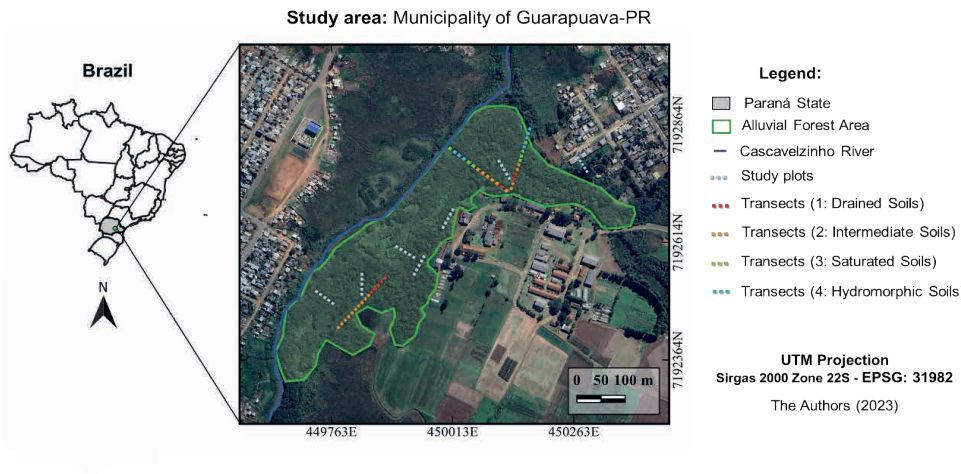

Figure 1 - Location of the study area and representation of study plots and transects on the CEDETEG Campus of the State University of the Center-West, Guarapuava, Paraná, Brazil.

The fragment has been measured periodically since the year 2011. Between January

and March 2020, the floristic survey and measurement of the Diameter at Breast Height (DBH) of the trees were carried out considering individuals with DBH ≥ 5 cm, in 72 sampling subunits of 10 x 10 m (100 m2). The collected species were incorporated into the collection of the Herbarium of the State University of the Center-West (ARAUCA), CEDETEG campus, municipality of Guarapuava-PR. Species not possible to collect their individuals were compared with the material deposited at the HUCO - Herbarium of the State University of the Center-West, Campus Irati-PR. The botanical nomenclatures followed the Angiosperm Philogeneny Group IV pattern (CHASE et al., 2016).

In a previous study, the piezometric level and soil moisture were raised to correlate with the development of the forest, identifying four groups represented in Figure 1 (1: areas with drained soils; 2: soils with intermediate characteristics; 3: saturated soils and 4: hydromorphic soils) (see more in GUILHERMETI, 2015). The same sampling subunits were used in this research. To classify the four groups determined from the hydromorphy and verify their significance, the Discriminant Analysis (DA) with Fisher's Linear Discriminant method was performed. Analyzes were performed using software© Copyright IBM Corporation, trial version (IBM SPSS, 2021).

The phytosociological descriptors used to analyze the horizontal structure of the forest were: Absolute (AD) and Relative (RD) Densities, Absolute (AF%) and Relative (RF%) Frequencies, Absolute (ADo) and Relative (RDo) Dominance, Coverage Value (CV) and Importance Value (IV) (FREITAS; MAGALHÃES, 2012). For the comparison between the ecological structure of the forest as a whole and of each grouping, the distribution of individuals in diameter classes was performed, using an amplitude of 10 cm.

The ecological indices of Shannon-Wiener Diversity (H'), Simpson Dominance (C), Pielou Equitativity (J'), Jaccard Similarity (Sj) and Jentsch Mixing Coefficient (QM) were calculated, using the R program (R DEVELOPMENT CORE TEAM, 2022), using the Vegan package (OKSANEN et al., 2014).

3 | RESULTS

A total of 1,773 individuals (2,462.5 ind ha-1) were sampled in the analyzed fragment, distributed in 28 families, 43 genera and 55 species. The richest botanical families were: Myrtaceae (16%) and Lauraceae (10%). However, the most abundant individuals in the total area were: *Gymnanthes klotzschiana* (1,179.17 ind ha^{-1}), *Matayba elaeagnoides* (290.28 ind ha^{-1}) and *Ligustrum lucidum* (175 ind ha^{-1}) (Table 1).

It is observed, through the discriminant analysis, that the four determined ecological groups were different, as their centroids were classified as equidistant from each other. All subplots were correctly classified (Figure 2), considering the analysis to be satisfactory.

FAMILY/SPECIES	1	2	3	4	AD (ind ha^{-1})
Anacardiaceae					
Lithraea brasiliensis Marchand	1*	1			2.78
Lithraea molleoides (Vell.) Engl.		2		2	5.56
Schinus terebinthifolia Raddi	2	4	2		11.11
Annonaceae					
Annona sylvatica A.St.-Hil.	3				4.17
Aquifoliaceae					
Ilex brevicuspis Reissek		8	2		13.89
Ilex dumosa Reissek	5	11	5		29.17
Ilex theezans Mart. ex Reissek	14	20	10	37	68.06
Araucariaceae					
Araucaria angustifolia (Bertol.) Kuntze	3		2		6.94
Asteraceae					
Moquiniastrum polymorphum (Less.) G. Sancho	2	1			4.17
Vernonanthura discolor (Spreng.) H.Rob.	2	1			4.17
Bignoniaceae					
Adenocalymma album (Aubl.) L.G.Lohmann	2	2		2	8.33
Adenocalymma marginatum (Cham.) DC.		2		2	5.56
Dolichandra unguis-cati (L.) L.G.Lohmann		1		1	2.78
Handroanthus albus (Cham.) Mattos		4	2		8.33
Jacaranda micrantha Cham.		6			8.33
Canellaceae					
Cinnamodendron dinisii Schwacke	13	11	7	6	51.39
Celastraceae					
Monteverdia aquifolia (Mart.) Biral	1	3			5.56
Clethraceae					
Clethra scabra Pers.		14	1	2	23.61
Dicksoniaceae					
Dicksonia sellowiana Hook.	10	7	7	6	41.67
Ebenaceae					
Diospyros kaki L.		1			1.39
Erythroxylaceae					
Erythroxylum deciduum A.St.-Hil.	3	5	3		15.28
Euphorbiaceae					
Sapium glandulosum (L.) Morong	1	3			5.56
Gymnanthes klotzschiana Müll. Arg	151	228	187	283	1179.17
Fabaceae					
Mimosa scabrella Benth.	5				6.94
Lamiaceae					
Vitex megapotamica (Spreng.) Moldenke	4	10	4	2	27.78

FAMILY/SPECIES	1	2	3	4	AD (ind ha^{-1})
Lauraceae					
Aiouea amoena (Nees & Mart.) R. Rohde	1				1.39
Cryptocarya aschersoniana Mez	1				1.39
Ocotea diospyrifolia (Meisn.) Mez	1	2	2		6.94
Ocotea puberula (Rich.) Nees	3	10	5	3	29.17
Ocotea pulchella (Nees & Mart.) Mez	7	1	3	3	19.44
Loganiaceae					
Strychnos brasiliensis (Spreng.) Mart.		1			1.39
Malvaceae					
Luehea divaricata Mart.	1	2			4.17
Myrtaceae					
Campomanesia guazumifolia (Cambess.) O.Berg	1				1.39
Campomanesia xanthocarpa (Mart.) O.Berg			2		2.78
Eugenia involucrata DC.			1		1.39
Eugenia pyriformis Cambess.		1			1.39
Eugenia uniflora L.				1	1.39
Myrcia glomerata (Cambess.) G.P.Burton & E.Lucas		4			5.56
Myrcia retorta Cambess.	4			1	6.94
Myrcia palustris DC.	1	2			4.17
Myrcianthes gigantea (D.Legrand) D.Legrand	1				1.39
Oleaceae					
Ligustrum lucidum W.T.Aiton	71	14	19	22	175
Primulaceae					
Myrsine coriacea (Sw.) R.Br. ex Roem. & Schult.	1	1		1	4.17
Myrsine umbellata Mart.			2		2.78
Proteaceae					
Roupala montana var. brasiliensis			1		1.39
Rosaceae					
Prunus myrtifolia (L.) Urb.	18	36	14	4	100
Rubiaceae					
Cordiera concolor (Cham.) Kuntze		3			4.17
Rutaceae					
Zanthoxylum rhoifolium Lam.	9	10	15	2	50
Salicaceae					
Casearia decandra Jacq.	22	20	15	8	90.28
Xylosma ciliatifolia (Clos) Eichler	5	3	1	1	13.89
Sapindaceae					
Allophylus edulis (A.St.-Hil. et al.) Hieron. ex Niederl.	18	2	14	8	81.94
Cupania vernalis Cambess.	4				5.56
Matayba elaeagnoides Radlk.	72	67	33	37	290.28

FAMILY/SPECIES	1	2	3	4	AD (ind ha^{-1})
Solanum mauritianum Scop.	2	2		1	6.95
Styracaceae					
Styrax leprosus Hook. & Arn.			1		1.39

Where: 1: Drained soils, 2: Intermediate condition, A3: Saturated soil, A4: Hydromorphic soils, AD: absolute density (ind ha^{-1}), * number of individuals in the group. Source: Authors (2023)

Table 1 – List of families, species and occurrence of individuals in an urban fragment of the Mixed Alluvial Ombrophilous Forest, in the municipality of Guarapuava-PR (2020).

Group 1, typical of a well-drained area, had 464 individuals and 37 species in an area of 0.27 ha. Group 2, with intermediate characteristic between groups, 526 individuals and 40 species in 0.20 ha. Group 3, with water saturation soils, 360 individuals and 27 species, corresponding to 0.15 ha. Group 4, where the greatest hydromorphism occurs, identified 435 individuals and 23 species in 0.1 ha. Groups 1 and 2 have similar characteristics, consisting of greater abundance of individuals and species richness. In 3 and 4, there is a predominance of certain species and a decrease in the others, present in 1 and 2. There were 14 common species in the 4 groups (Table 1).

Only in group 2, *L. lucidum* does not occupy the third place of IV (%) in the forest, passing this position to *Prunus myrtifolia* (Figure 3). Presenting itself better distributed in relation to other species. However, in group 1, its IV (%) is higher (12.15%) in relation to the other groups, denoting a greater occurrence of the species in places with good drainage conditions. In the conditions of group 2, *Prunus myrtifolia* and *Ocotea puberula*, present higher phytosociological descriptors than the others, that is, the intermediate soil conditions are more favorable for the development of these species.

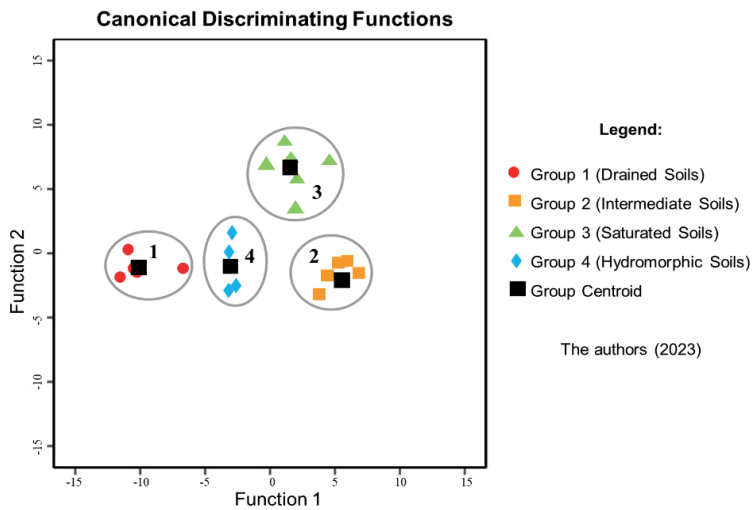

Figure 2 – Classification of ecological groups and their respective portions by discriminant analysis.

Araucaria angustifolia, an indicator species of the Mixed Ombrophilous Forest, obtained low IV (%), 4.03% in group 1 and 1.39% in group 2 and 3, with no individuals occurring in the area of greater hydromorphism, due to restrictions imposed by ground. *Dicksonia sellowiana* is found in all groups, however, in group 4, with conditions of greater hydromorphism, it presents better indices, with AD of 64 ind ha^{-1}, ADo of 2.80 m^2 ha^{-1} and IV of 8, 5% (Figure 3).

Among the groups, the minimum DBH value (Diameter at Breast Height) included was 5 cm, the maximum value was 70.66 cm, which corresponds to an individual of *A. angustifolia*. The highest mean value (12.17 cm) occurred in group 4, in an area of greater hydromorphism, where the standard deviation between diameters decreases in this group, with a coefficient of variation of 44.83%. The mean values for group 1 are closer to the forest and the coefficient of variation is closer to group 2 (Table 2).

The distribution of individuals in the class centers showed a negative exponential pattern in the first 3 groups and in the forest in general, that is, there was a high concentration of individuals in the smaller diameter classes and a decrease in the larger classes. In grouping 4, the distribution occurs differently, this shows that the analyzed fragment does not have significantly incoming individuals, the trees are, in general, similar to each other, which can probably assume a Gaussian distribution with time, also occurring, few individuals between DBH ≥ 25 and 35 cm (Table 2).

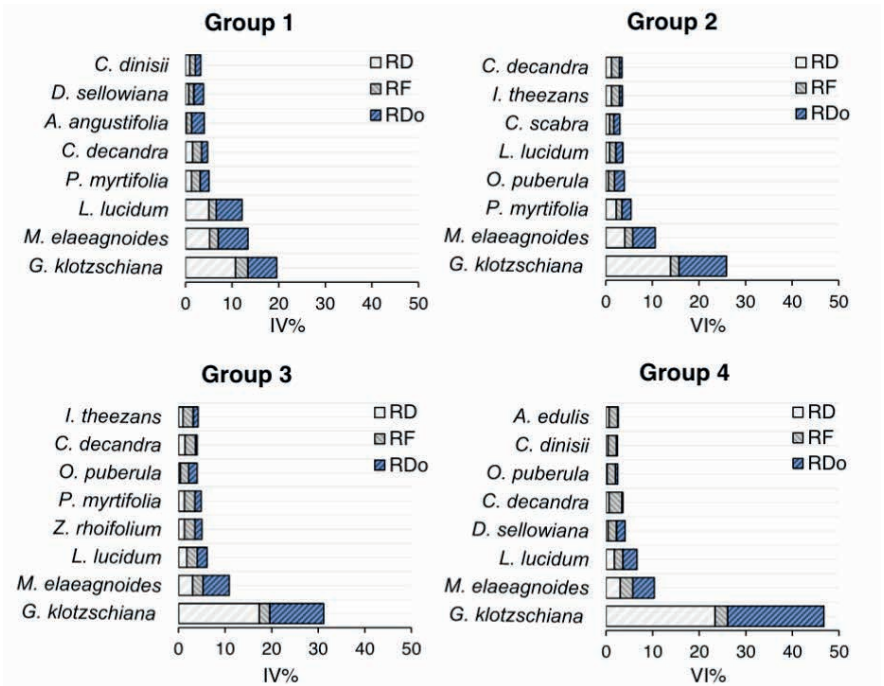

Figure 3 – Relative Density (RD), Frequency (RF) and Dominance (RDo) of the eight species with the highest occurrence among the four groups in a fragment of Mixed Alluvial Ombrophilous Forest, in the municipality of Guarapuava-PR (2020).

The diversity of the general forest obtained a Shannon-Wiener Index (H') of 2.23 nats ind^{-1}, which represents a low species diversity. Grouping 4 and 3 have a lower index, consequently less diversity, while the more drained areas (Group 1 and 2) have greater diversity. When the species of the 4 groups were analyzed together, it presented a Simpson Dominance Index (C) of 0.25, it is suggested that there is a 25% probability of dominance by some species in the studied fragment. Groups 1 (0.16), 2 (0.20) and 3 (0.29) have low dominance values, indicating greater diversity.

In alluvial areas, few species predominate with a larger number of individuals, noted by Pielou's Equitativity (J'), in the more drained groups the equitability was closer to 1, and in grouping 4 (0.42), in a place of greater hydromorphism, the dominance of certain species was evidenced.

Variables	Average	CV%	H'	C	J'	QM	Diametric Distribution
Group 1	11.23 ± 6.66 cm	59.29	2.45	0.16	0.67	1:12	
Group 2	10.43 ± 5.8 cm	55.6	2.42	0.2	0.65	1:13	
Group 3	11.37 ± 6.64 cm	58.46	2.02	0.29	0.60	1:13	
Group 4	12.17 ± 5.45 cm	44.83	1.33	0.5	0.42	1:18	
Forest	11.23 ± 6.17 cm	54.94	2.23	0.25	0.54	1:31	

Where: CV%: Coefficient of Variation, H': Shannon-Wiener Diversity Index, C: Simpson Dominance Index, J': Pielou Equality and QM: Jentsch Mixing Coefficient. Source: Authors (2023).

Table 2 – Descriptive Statistics of Diameter at Breast Height (DBH), Ecological Indices and Diametric Distribution Profile between the groups and General Forest in Mixed Alluvial Ombrophilous Forest, in Guarapuava-PR, in 2020.

Comparing the Jaccard Similarity Index (Sj) between the characteristic groupings of the soil water condition with relation to the floristic as a whole, areas 3 (52%) and 4 (60%), with respectively 28 and 23 species in common, have high levels of similarity with the forest, which may serve as a floristic reference for carrying out conservation actions. Groups 2 (29%) and 1 (33%), on the other hand, exhibit less similarity in relation to the forest, however, with a greater number of species in common.

The Jaccard Index indicated that groups 1 and 4 have 49% similarity, with 17 species in both groups, as well as group 2 and 4, 48%, groups 1 and 3, and 2 and 3 have 40% similarity. The lowest floristic similarity was determined between groups 1 and 2 with 20%, with 29 species in common and 3 and 4 (36%), with 15 species in common.

The Jentsch mixing coefficient (QM) shows, on average, the number of individuals of each species identified in the community and measures the intensity of species mixing. The area of the most drained groups was shown as 1:12 and 1:13, that is, there are, on average, 12 and 13 individuals of each species. Therefore, in the group with greater hydromorphism (1:18), it portrays a greater uniformity of species.

4 | DISCUSSION

The results of this study show how soil hydromorphic conditions influence the tree community and the diversity of the alluvial ecosystem. Considering hydromorphism as an environmental filter, which justifies the species to change in relation to time and space, due to ecological and evolutionary determinants. Thus, environmental variables are indicators of a complex mosaic of interactions, summarizing information about the needs of plants, which reflect on the parameters of the community structure (GUIMARÃES et al., 2021). Flooding causes changes in the soil environment and flood tolerance varies between species, plant age and time and duration of flooding. In general, the functional attributes may change according to the environment, as well as specific leaf area, leaf thickness, stomatal density and photosynthetic rates change according to flooded zones (HERRERA; ESCALA; RENGIFO, 2009).

Species that inhabit ecosystems where flooding regularly occur have developed adaptive strategies that influence the fitness of the species to deal with the stress mediated by this exposure (KREUZWIESER; RENNENBERG, 2014). Less diversity, evenness and richness, and greater dominance of woody species are evidenced in environments where hydromorphism was more pronounced (RIBAS ZACARIAS et al., 2012). Due to the fact that few species are morphologically adapted to support an excess of water, there is a decline in diversity and an increase in the dominance of adapted species according to soil saturation.

Among the anatomical structures that contribute to the tolerance of plants to a prolonged flooding condition, adventitious roots, aerenchyma and lenticels stand out. Adventitious roots are produced when the tree's primary root system is damaged because of oxygen deficiency in the soil, they have a large portion of intercellular spaces, facilitating the longitudinal transport of oxygen. The air reserve parenchyma, the root aerenchyma act as an oxygen reserve, the formation of air gap spaces increases the porosity of the root tissue. Stem hypertrophied lenticels are important for the supply of oxygen necessary for respiration, which comes from the atmosphere or from photosynthetic organs, which approach the roots by the aerial interconnections of the stem and root tissues, also contributing to the release of gaseous compounds for the atmosphere (KREUZWIESER; RENNENBERG, 2014).

G. klotzschiana was the most abundant species in the entire fragment, this species has the aforementioned adaptations and supports variations in soil water saturation, and its germination is still favored in hydromorphic soils. In some cases, it configures dominant populations (KIERAS; MACHADO; ACCIOLY, 2018). *M. elaeagnoides* occurs distinctly from *G. klotzschiana*, showing that the species does not prefer environments with higher soil moisture. However, it is common in MOF surveys, where the soils have better drainage capacity (MARTINS et al., 2017).

L. lucidum is a representative invasive species in the forest, it is adapted to the

hydromorphic condition, with high phytosociological descriptors in the fragment. It was originally introduced outside its native range for ornamental purposes. In the study fragment, this species was introduced incidentally, by adult individuals employed in the afforestation of the city, the propagules were dispersed by the river and it has been developing in the forest. Behaving as a threat to natural species, changing the functional activity and the food chain, competing for light, nutrients, space and dispersing fauna (FERNANDEZ et al., 2020).

D. sellowiana stands out in the forest understory and is close to hydromorphic environments, as its reproduction is dependent on water, presenting high phytosociological descriptors for the studied area. The economic exploitation of this species for ornamental and landscape purposes resulted in its inclusion in Official Lists of Endangered Flora Species. At a local scale, this species acts by promoting biological diversity, increasing habitat heterogeneity. Facilitating the coexistence of species, inhibiting the dominance of some woody plants and providing habitat for the establishment of epiphytes and hemiepiphytes, which increases plant diversity in the forest (NEGRÃO et al., 2017).

Descriptive statistics shows that group 4, of hydromorphic soils, presents higher diameter values with less variation compared to the other groups and the Forest. Analyzing the diametric distributions, this group presented a distinct curve of an "inverted J", that is, it does not present a greater amount of trees in smaller size classes. Some authors relate the occurrence of distributions other than the negative exponential to regeneration problems or the occurrence of anthropic actions in communities. On the other hand, the exponential-type curve assumes that the populations that make up the community are stable and self-regenerative (CYSNEIROS et al., 2017), which occurs in the other groups and in the forest.

The forest fragment has low diversity (H'), but in common with studies in other alluvial areas (GONÇALVES et al., 2018). Areas with greater hydromorphism also denote the lowest diversity value (H') and the highest dominance value (C). In these areas, *G. klotzschiana* and *L. lucidum* are dominant species, which develop together as a result of their adaptations.

Groups 1 and 4 show moderate similarity (49%) and the areas with the highest hydromorphic condition show high similarity with the forest (60%). Whereas, on a similarity scale, values up to 25% correspond to low similarity, 26% and 50% moderate similarity, 51% to 75% high similarity. The Jentsch mixture coefficient identifies the degree of uniformity of individuals distributed among species, indicating, on average, the number of trees of each species found in the stand (MOJENA; FRANÇA, 2017). Thus, environments with greater hydromorphism present greater uniformity of species, denoting the real dominance of species adapted to these locations.

Also, certain species relatively abundant in areas with more drained soil (Group 1), had fewer individuals in the groups where the soil water saturation increased (Group 3) and no longer occur in the group with the greatest hydromorphism (Group 4), an example of *Lithraea brasiliensis*, *Vernonanthura discolor*, *Aiouea amoena*. Species that were not

present in group 1 were sampled exclusively in group 4 (*Solanum mauritianum* and *Eugenia uniflora*). Evidencing an indicator pattern of a selective filter in relation to hydromorphic conditions (OLIVEIRA et al., 2019), in which the species composition follows a flood gradient, where the plots closer to the river have lower richness, composition and distribution of species.

Thus, the more pronounced hydromorphic condition reflects in lower species richness near the river banks, with fewer species able to thrive in the adverse conditions imposed by the flood (GUIMARÃES et al., 2021). Trees close to the river benefit from their tolerance to the effects of flooding, and at the same time, take advantage of the greater availability of nutrients in the soil deposited by the river, in addition to less competition with other individuals (ABEL et al., 2020).

5 I CONCLUSION

The hydromorphic conditions in the alluvial fragment studied act as filters, because the closer to the river, the vegetation tends to present less diversity and certain species become dominant, decreasing the number of species, but increasing the number of individuals of species adapted to the water saturation conditions. The groupings formed are constituted by similar species, but they occur differently in relation to the phytosociological descriptors. The diametric distribution of the most drained groups, the saturated environment and the forest indicate that regeneration occurs continuously, unlike what happens in the area with greater hydromorphism. Groups with greater water saturation have higher similarity rates with the forest, which can be explained by the dominance of *G. klotzschiana* and *L. lucidum*, which tends to occur in greater numbers in hydromorphic areas.

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