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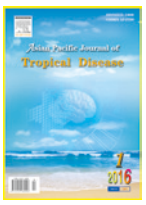

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Floristic composition, biological spectrum and conservation status of the vegetation in Nikyal valley, Azad Jammu and Kashmir

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ABSTRACT

Objective: To analyze floristic compositions, biological spectrum and conservation status of the existing vegetation in valley.

Methods: A quantitative phytosociological survey was conducted using quadrat method at different sites. Sampling was done by using quadrat method. A complete floristic list of the plant communities of the study area was compiled on the basis of plant collection. Life form and leaf spectra were constructed using the complete list of the plant communities collected from study area. Conservation status of each species was established on the basis of International Union for Conservation of Nature criteria.

Results: The flora of Nikyal valley consisted of 110 species belonging to 51 families and 98 genera. Poaceae (18 spp.), Asteraceae (10 spp.), Lamiaceae (8 spp.) and Fabaceae (7 spp.) were the leading families in the area. Biological spectrums of 13 different plant communities were grouped into four plant associations on the basis of cluster analysis and detrended correspondence analysis. The data showed that hemicryptophytes (32.73%) were the dominant life form in the area followed by therophytes (23.64%) and nanophanerophytes (22.73%) during monsoon season. Similarly, nanophyllous species (37.27%) followed by microphyllous species (29.09%) remained dominant during monsoon in the investigated area.

Conclusions: The majority of important plant species of Nikyal valley are critically endangered, therefore effective measures for conservation of plant resources of the valley are urgently needed. We recommend the floristic life-form spectrum technique if working in sufficiently large areas, because it could provide an indication of the prevailing phytoclimate.

1. Introduction

A flora is comprised of all plant species in any specific geographic region, which are characteristic of a geological period or inhabit a particular ecosystem. The flora includes a number of species, while vegetation refers to their distribution and the number of individuals and size of each[1]. Inventory of floras by plant taxonomists is a common practice throughout the world. A flora is a compiled checklist of plant species growing in any geographic area. Through this practice, valuable data are recorded and can be used as reference for future studies. Since the world is extremely variable, a vast range of floras are available ranging from concise or Field Floras to Research Floras[2]. Biological spectrum of vegetation is the index of the phytoclimate, deduction of which is based on diverse life-forms[3]. The life-form spectra reflects the physiognomy of the flora and vegetation, which is the result of entire life processes in combination with environmental variables. Life-form tells us about the climate of area and can be predicted for particular climate, properties of any continent, biogeographic region and altitude[4-6]. It helps in the recognition of ecological elucidation of vegetation and differs in every zone on the basis of altitude. Life-form classification is more reliable after other phytosociological attributes, which is based upon the principal position of the parenting bud on the plant, as well as its degree of protection during the unfavorable or adverse condition[7]. Similarly, the knowledge of leaf size may help to understand the physiological processes of plants and plant communities[8].

Some studies on the evaluation of ecological characters of

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vegetation have been done by different scientists in various parts of the world including Pakistan[9-18]. Few studies have been done on these aspects in Azad Jammu and Kashmir[19-23]. In view of the above applications of Raunkiaerian concepts, an attempt was made to ascertain the variation of life-form and leaf size spectra of four plant associations in various climatic zones of Nikyal valley. The second main objective was to elucidate the relationship between vegetation and an elevation role of anthropogenic activities and environmental factors on the observed trends. The third main objective was to forecast the conservations status of economically important flora. The findings of the present study might help ecologists, ethno botanists and conservationists to work for the development of area.

2. Materials and methods

2.1. Study area

Nikyal hills are located in Kotli District, Azad Jammu and Kashmir at an altitude of 1 500–1 900 m. They are located in 30 km away from Kotli towards north. The investigated area lies within longitude 74°04' to 74°10' E and latitude 33°26' to 33°29' N. It is surrounded by Kotli on south, on western side by Tatapani, on northern side by Mender and on east by Pir-Panjal (Figure 1).

Figure 1. Map of Kotli District, Azad Jammu and Kashmir.

The climate of Nikyal valley is of sub-tropical humid type with average annual rainfall of 95.60 mm. The maximum rainfall occurs during July amounting to 251.52 mm, while least rainfall occurs during November amounting to 14.44 mm. The hottest two months of the year are June and July, with mean daily maximum temperature of 37.69 ˚C and 34.82 ˚C respectively and minimum temperature of 23.61 ˚C and 23.62 ˚C respectively, while the coldest two months of year were December and January, with mean maximum temperature of 19.99 ˚C and 18.09 ˚C respectively and minimum temperature of 5.49 ˚C and 4.41 ˚C respectively. The average maximum and minimum relative humidity received by the area is 79.64% and 30.82% respectively[24].

2.2. Methodology

The investigated area was divided into 13 plant communities on the basis of altitude and physiognomic difference. These communities were grouped into four plant associations on the basis of cluster analysis and detrended correspondence analysis. The plants which were collected during sampling were dried carefully and mounted on herbarium sheet. They were identified by Nasir and Ali[25] and Ali and Qaisar[26].

Life-form showed the climate of an area. Plants were classified into different life-form classes according to Raunkiaer[7] and Mueller-Dombois and Ellenberg[27]. The knowledge of leaf size helps us understand the physiological process of plants and plant communities and also can be used full in classifying the associations of plants. Plants were divided into (A) leptophyll (25 mm^2), (B) nanophyll (225 mm^2), (C) microphyll (2 025 mm^2) and (D) mesophyll (18 225 mm^2). For this estimation in the area, Raunkiaer diagram was used. Based on the data derived from the ecological evaluatation and local people perception, conservations status of medicinal and other useful plants were ascertained according to International Union for Conservation of Nature categorization[28]. The survey was done during monsoon, 2012. The area ranged between 1 500 and 1 900 m from the mean sea level.

3. Results

3.1. Floristic composition

The flora of Nikyal valley consisted of 110 plant species which belonged to 51 families as recorded during July 2012 to June 2013. Poaceae was dominated in the investigated area having 18 species which was followed by Asteraceae, Lamiaceae and Fabaceae with 10, 8 and 7 species respectively. Cyperaceae and Rosaceae had 5 species each. Acanthaceae, Euphorbiaceae, Malvaceae and Polygonaceae had 3 species each. Convolvulaceae, Rubiaceae and Solanaceae had 2 species each. Remaining 38 families had a single species (Table 1).

3.2. Life-form spectra

The biological spectrum was tested based on the life-form.

3.2.1. Olea-Pinus-Themeda association

This association was harboured at an altitude of 1 540–1 655 m. Therophytes were the dominant components (20, 35.71%), followed

Table 1

Life-form and leaf spectra of vegetation in Nikyal valley, Kotli District, Azad Jammu and Kashmir.

Family name	Species name	Habit	Life-form	Leaf spectra	Conservation status
Acanthaceae	*Dicliptera roxburghiana* Nees	Herb	Th	Mi	NT
	Justicia procumbens L.	Herb	Th	N	NT
	Rhus cotinus L.	Shrub	Np	Mi	NT
Adiantaceae	*Adiantum venustum* D. Don	Herb	G	L	E
Amaranthaceae	*Achyranthes aspera* Wall.	Herb	Th	Mi	CE
Apiaceae	*Bupleurum flacatum*	Herb	H	Mi	E
Apocynaceae	*Nerium indicum* Mill	Shrub	Np	Mi	E
Araceae	*Arisaema jacquemontii* Blume	Herb	G	Me	E
Araliaceae	*Hedra nepalensis* K. Koch	Herb	Li	Mi	E
Asteraceae	*Achillea millefolium* L.	Herb	H	L	CE
	Bidens biternata (Lour.) Merr. and Sherf.	Herb	H	N	V
	Anaphalis margaritacea (L.) Bth.	Herb	H	Mi	CE
	Conyza canadensis L.	Herb	Th	N	CE
	Conyza ambigua Hook & Arn	Herb	Th	N	CE
	Gerbera gossypina (Royle)	Herb	Th	Mi	V
	Sonchus arvensis L.	Herb	Th	N	CE
	Sonchus asper Hill	Herb	Th	N	E
	Taraxacum officinale Weber	Herb	H	N	V
	Tussilogo farfara L.	Herb	Th	Me	CE
Balsaminaceae	*Impatiens edgeworthii* H.K.f	Herb	Th	L	CE
Berberidaceae	*Berberis lycium* Royle	Shrub	Np	N	NT
Boraginaceae	*Cynoglossum lanceolatum* Forssk	Herb	H	N	NT
Buxaceae	*Sarcococca saligna* (D. Don) Muel	Shrub	Np	Mi	CE
Caprifoliaceae	*Viburnum grandiflorum* Wallich ex DC	Herb	Np	Me	NT
Commelinaceae	*Commelina benghalensis* Linn., Sp. Pl.	Herb	Th	Mi	E
Convolvulaceae	*Ipomoea purpurea*	Herb	Li	Mi	E
	Ipomoea cordata	Herb	Li	Mi	E
Crassulaceae	*Bryophyllum pinnatum* Kurz	Herb	Th	Me	E
Cyperaceae	*Cyperus difformis* L.	Herb	G	N	CE
	Cyperus niveus Retz	Herb	G	L	V
	Cyperus rotundus L.	Herb	G	N	V
	Cyperus globosus Forssk.	Herb	G	L	CE
	Eriophorum comosum Wall	Herb	G	Mi	V
Dryopteridaceae	*Dryopteris stewartii* Fress	Herb	G	N	E
Elaeagnaceae	*Elaeagnus parvifolia* Wall. ex Royle	Herb	Np	Mi	E
Euphorbiaceae	*Euphorbia helioscopia* L.	Herb	Th	N	E
	Euphorbia prostrata Ait	Herb	H	L	E
	Euphorbia wallichii Hook f.	Herb	H	N	V
Fabaceae	*Lespedeza juncea* (L.f.) Pers.	Herb	Th	L	V
	Medicago denticulata Willd	Herb	Th	L	CE
	Indigofera heterantha Wall.	Herb	Np	N	NT
	Melilotus indicus (L.) All.	Herb	Th	Mi	NT
	Rhynchosia hirta	Shrub	Np	Mi	CE
	Trifolium repens L.	Herb	H	Mi	CE
	Quercus dlatata Lind	Tree	Mp	Mi	NT
Geraniaceae	*Geranium rotundifolium* L.	Herb	Th	N	NT
Hypericaceae	*Hypericum perforatum* L.	Herb	Th	N	CE
Juncaceae	*Juncus serotinus* Clarke	Herb	G	N	E
Lamiaceae	*Ajuga bracteosa* Wallich	Herb	Ch	Mi	E
	Colebrookia oppositifolia Sm.	Shrub	Np	Mi	V
	Micromeria biflora (Ham) Bth	Herb	Th	L	NT
	Otostegia limbata (Bth) Boiss	Shrub	Np	L	CE
	Plectranthus rugosus Wall.	Shrub	Np	L	V
	Prunella vulgaris L.	Herb	G	N	E
	Rabdopsia rugosa (Wall. ex Benth.) H. Hara	Shrub	Np	N	NT
	Scutellaria linearis Benth	Herb	H	N	NT
Loranthaceae	*Loranthus pulverulentus* Wall. in Roxb	Shrub	Np	Me	E
Lythraceae	*Woodfordia floribunda* Salisb	Shrub	Np	N	V
Malvaceae	*Grewia villosa* Willd	Shrub	Np	Me	CE
	Malvastrum coromandelianum L.	Herb	Th	Mi	NT
	Malva parviflora L.	Herb	H	Mi	CE
Moraceae	*Ficus palmata* Forssk	Shrub	Np	Me	E

Table 1 (*continued*)

Family name	Species name	Habit	Life-form	Leaf spectra	Conservation status
Myrsinaceae	*Myrsine africana* L.	Shrub	Np	N	NT
Oleaceae	*Olea ferruginea* Royle	Tree	Mp	N	NT
Onagraceae	*Oenothera rosea* (L). Her	Herb	H	N	E
Oxalidaceae	*Oxalis corniculata* L.	Herb	H	N	NT
Pinaceae	*Pinus roxburghii* Sargent	Tree	Mp	L	NT
Poaceae	*Agrostis canina* auct	Herb	H	L	CE
	Andropogon gerardii Vitman	Herb	H	L	E
	Aristida adscensionis L.	Herb	H	L	V
	Imperata cylindrica (L.)	Herb	H	L	NT
	Brachiaria eruciformis (J. E. Smith) Griseb	Herb	H	L	NT
	Brachiaria reptans (L.) Gardner and Hubbard	Herb	H	L	V
	Chrysopogon aucheri (Boiss.) Stapf	Herb	H	L	NT
	Cymbopogon jwarancusa (Jones) Schult.	Herb	H	L	V
	Cynodon dactylon (L.) Pers	Herb	H	L	NT
	Phalaris arundinacea	Herb	H	L	V
	Dichanthium annulatum (Forssk). Stapf	Herb	H	L	NT
	Eragrostis japonica (Thunb.) Trin.	Herb	H	L	NT
	Heteropogon contortus (L.)	Herb	H	L	NT
	Poa annua L.	Herb	H	L	NT
	Saccharum spontaneum L.	Herb	H	L	CE
	Sorghum halepense (L.) Pers	Herb	H	L	NT
	Setaria viridis var.	Herb	H	L	V
	Themeda anathera (Hack)	Herb	H	L	NT
Polygonaceae	*Rumex hastatus* D. Don	Shrub	Np	Mi	E
	Rumex nepalensis	Herb	H	Me	E
	Polygonum aviculare L.	Herb	H	N.	CE
Primulaceae	*Androsace rotundifolia* Hardw	Herb	H	N	CE
Pteridaceae	*Pteris cretica* L.	Herb	G	Mi	V
Punicaceae	*Punica granatum* L.	Tree	Mp	N	NT
Ranunculaceae	*Clematis grata* Wallich	Herb	Li	Mi	
Ranunculaceae	*Ranunculus muricatus* L.	Herb	Th	Mi	V
Rhamnaceae	*Ziziphus jujuba* Mill	Shrub	Np	Mi	CE
Rosaceae	*Contoneaster acuminatus* Linley	Shrub	Np	N	E
	Prunus persica (L.) Batsch	Tree	Mp	N	V
	Rubus fruticosus Wallich.	Shrub	Np	Mi	NT
	Rubus niveus Wallich	Shrub	Np	N	E
	Fragaria nubicola Lindl ex Lacaita	Herb	Th	N	NT
Rubiaceae	*Galium elegans* Wall.	Herb	Th	N	NT
	Rubia tinctorum L.	Herb	H	N	E
Rutaceae	*Zanthoxylum alatum* Roxb.	Shrub	Np	N	CE
Sapindaceae	*Dodonaea viscosa* (L.) Jacq	Shrub	Np	N	CE
Saxifragaceae	*Bergenia ligulata* (Str) Hot	Herb	G	Mi	CE
Solanaceae	*Solanum nigrum* L.	Herb	Th	Mi	CE
	Solanum surattense Burm. f.	Herb	Th	Mi	CE
Urticaceae	*Debregeasia salicifolia* (D. Don) Rendle	Shrub	Np	N	E
Valerianaceae	*Valeriana jatamansi* Jones	Herb	G	Mi	CE
Verbenaceae	*Origanum vulgare* L.	Herb	H	N	V
Violaceae	*Viola odorata* L.	Herb	Th	N	V

Mp: Megaphanerophytes; Np: Nanophanerophytes; Th: Therophytes; H: Hemicryptophtes; G: Geophytes; Ch: Chamaeophytes; Li: Linans; L: Leptophylls; N: Nanophylls; Mi: Microphylls; Me: Mesophylls; E: Endangered/Extinct; CE: Critically endangered; NT: Near threatened; V: Vulnerable.

by hemicryptophytes (18, 32.14%), nanophanerophytes (7, 12.50%), geophytes (4, 7.14%), megaphanerophytes (4, 7.14%), liana (2, 3.57%) and chamaephytes (1, 1.78%).

3.2.2. Myrsine-Rhus-Quercus association

At an altitude of 1 535–1 710 m, *Myrsine-Rhus-Quercus* association was recognized. The association was characterized by hemicryptophytes (22, 30.14%), followed by nanophanerophytes (18, 24.66%), therophytes (17, 23.29%), geophytes (9, 12.33%). Linans and megaphanerophytes were (3, 4.11%). Chamaeophytes (1, 1.37%) were the least.

3.2.3. Quercus-Rubus-Pinus association

This association was harboured at an elevation of 1 650–1 820 m. Hemicryptophytes (23, 35.39%) were the dominant components of this association, followed by therophytes (14, 21.54%), nanophanerophytes

(14, 21.54%), megaphanerophytes (3, 4.61%), geophytes (8, 12.31%), linans (2, 3.08%) and chamaeophytes (1, 1.54%).

3.2.4. Quercus association

At the top of Nikyal valley (altitude: 1 420–1 870 m), *Quercus* association was recognized. Dominant life-form was hemicryptophytes (23, 33.82%), followed by nanophanerophytes (17, 25.00%), therophytes (15, 22.06%), geophytes (7, 10.29%), megaphanerophytes (3, 4.41%), liana (2, 2.94%) and chamaeophytes (1, 1.47%).

As a whole, Nikyal valley was dominated by hemicryptophytes (36, 32.73%). The hemicryptophtes were followed by therophytes (26, 23.64%), nanophanerophytes (25, 22.37%), megaphanerophytes (5, 4.54%), geophytes (13, 11.82%), linans (6, 5.45%) and chamaeophytes (1, 0.91%).

3.3. Leaf spectra

3.3.1. Olea-Pinus-Themeda association

This association was reported at an elevation of 1 540–1 655 m. The association was characterized by nanophylls (24, 42.86%) as dominant life-form, followed by microphylls (15, 26.78%) and leptophylls (13, 23.21%). Mesophylls were the least (4, 7.14 %).

3.3.2. Myrsine-Rhus-Quercus association

This association was recorded at an altitude of 1 535–1 710 m. Nanophylls were the dominant components of this association (29, 39.73%), followed by microphylls (24, 32.88%) and leptophylls (16, 21.92%). Mesophylls were the least (4, 5.48%).

3.3.3. Quercus-Rubus-Pinus association

Quercus-Rubus-Pinus association was recognized at an elevation of 1 650–1 820 m. This association was dominated by nanophylls (27, 41.54%), followed by microphylls (20, 30.77%) and leptophylls (15, 23.08%) respectively. Mesophylls were the least (3, 4.61%).

3.3.4. Quercus association

At the top of Nikyal valley (altitude: 1 620–1 870 m), *Quercus* association was harboured. In this association, nanophylls were dominant (25, 36.76%), followed by leptophylls (20, 29.41%), microphylls (16, 23.53%) and mesophylls (7, 10.29%).

As a whole, Nikyal valley was dominated by nanophylls (41, 37.27%), followed by microphylls (32, 29.09%) and leptophylls (29, 26.36%). Mesophylls were the least (8, 7.27%).

4. Discussion

Floristic diversity is an indication of vegetation and plant resources of any area. Plant resources of any area are affected by agriculture, intense grazing, local inhabitants, nomads and natural disasters[28]. The floristic list of Kotli hills consisted of 110 species which were distributed among 51 families.

Poaceae, Asteraceae, Lamiaceae, Fabaceae and Cyperaceae were the families having five or more than five species. Scientists also observed that these families are dominant in some other parts of Azad Kashmir[29,30]. These are also reported as dominant families in Pakistan including Azad Jammu and Kashmir[31]. The results are also in line with Durrani *et al.*[11] and Marwat and Qureshi[32] who also reported these families as dominant in their respective investigated area.

Some other studies also indicated these families to be the major families in the flora of Pakistan and abroad[25,26,29,30,33-36]. Our findings are supported by them as the families have emerged as the most common families in the present case. The members of these families have wide ecological amplitude and for that reason, they were well represented in variety of habitats. In this present case, the environmental conditions vary from sub-tropical to moist temperate type, so these families were well represented.

Bilogical spectrum is an important part of vegetation description, ranking ahead to floristic composition[37]. Life-from spectra tell us about the climate of an area. These life-forms vary from zone to zone on the basis of altitude. Raunkiaer reported three types of climates on the earth which includes: phanerophyte in tropics, therophyte in deserts and hemicryptophyte in cold temperate zone[7].

The life-form spectra of Nikyal valley showed that hemicryptophytic species were dominant followed by therophyte. Similar finding was also reported by Amjad *et al.*[23] in moist temperate part of Pirchanasi hills. Hemicryptophytes are the indicator of temperate zone while the therophytes are the indicator of subtropical zone and disturbed vegetation[23,37,38].

The climate of the study area varies from sub-tropical to moist temperate type at different altitudes. The reported life-form is a reflection of existing environmental conditions. Nikyal valley is climatically cool at higher altitudes and warm at the base. That is why hemicryptophytes were dominated in *Myrsine-Rhus-Quercus* (1 535–1 710), *Quercus-Rubus-Pinus* (1 650–1 820) and *Quercus* association (1 620–1 870) while the therophytes were dominant in *Olea-Pinus-Themeda* association (1 540–1 655) only. These results are in agreement with Malik *et al.*[39] who reported hemicryptophytes as a dominant life-form at top and therophyte as a dominant life-form at base in Dao Khun. The findings are also in agreement with Amjad *et al.*[23] and Malik[29] who reported hemicryptophytes as dominant life-form, followed by therophytes in moist temperate parts of Pirchanasi, Ganga Choti and Bedorri hills.

Some researchers considered hemicryptophytes as dominant life-form in temperate or humid condition[40]. The present findings are also in line with Qadir and Tareen[41] and Shah *et al.*[42] who recorded hemicryptophytes as dominant life-form in temperate zone

of remote area of Pakistan.

Therophytes are the characteristics of dry climate. Therophytes and phanerophytes were the most dominant indicators of tropical and sub-tropical life-form spectra. The dominance for therophytes over other life-forms in *Olea-Pinus-Themeda* association revealed that it might be a response to the harsh climate and anthropogenic pressure on the flora of Nikyal valley.

The other possible reason could be the low availability of moisture in the form of rain. Our results, in this regard are agreed with Qureshi *et al.*[2] who reported similar findings from Koont. The dominance of therophytes in almost all the zones might be due to disturbed habitat, deforestation, overgrazing and trampling. Generally, these are dominant in spring and monsoon as they reflect seasonal variation.

Some researchers reported that in Girbanr and Dabargai hills, therophytes were dominant which was due to unfavorable habitat conditions[43]. Most of the workers reported the similar conclusions[20,22,23]. Our findings also support these findings.

In the investigated area, megaphanerophytes and nanophanerophytes were 4.54% and 22.73% which decreased with altitude. Phanerophyte is the best represented class in open physiognomies[44]. Nikyal valley also has great potential for the increase of phanerophytes but deforestation has decreased the dominancy of tree and shrubs.

Leaf spectra tells us about the plant associations of a community. Small leaves were present at the base while large leaves were present at high altitude. Smaller leaves are indicators of xeric conditions while larger leaves are indicator of temperate zone. In the investigated area, overall vegetation is dominated by nanophyllous followed by microphyllous and leptophyllous species. Mesophylls were the least in number. Scientists concluded that nanophyllous and microphyllous species were dominant due to temperate conditions[23]. So our findings in this regard agree with them.

The reduction in leaf size indicates dry and xeric condition. The climate is of sub-tropical type in the plains and temperate type in the upland. Microphyllous elements were dominant in wet climate while xeric habitat supports nanophyllous species. Researchers reported similar trends for the vegetation of Kotli hills[45]. Scientists reported large leaves as dominant of tropical wet forest[46]. Our results are not in agreement with them. Plant habit and root systems are also critical along with leaf size in determining particular zone or climate. Due to the relationship between leaf size and cold or hot climate, leaf size is an adaptive feature of moisture retention. Moisture retention factor is the most important in the areas, where temperature is low and temperature sensitive root decreases water absorption from soil. The soils in mountainous region are generally poor and face great difficulty in absorbing nutrients from soil. Under cold conditions, root also absorbs low moisture and nutrients. The present results are in line with Malik *et al.*[34] who reported high percentage of microphyllous and nanophyllous species in moist temperate part of Ganga Chotti and Bedorri hills. These are also in agreement with Qadir and Tareen who recorded high percentage of microphyllous and nanophyllous in dry temperate climate of Quetta[41].

The present study is the first floristic study of Nikyal valley and shows the importance of the region in term of plant diversity (low ratios). Species numbers were very high compared to different region of Kotli District. A glimpse on the floristic composition indicates the need to consider the Nikyal valley as a protected area. Although restricted to a small site, our study did not support Raunkiaer's idea of the frequency spectrum as a good descriptor of the life-forms distribution in a certain plant community[7]. The floristic life-form spectrum is recommended if working in sufficiently large areas, when it could provide an indication of the prevailing phytoclimate. The frequency spectrum is not recommended at all, since it was not significantly different from the floristic one and because frequency is not a good estimator of abundance. Further study is needed to quantify the data and suggest plans for the conservation of the area.

Conflict of interest statement

We declare that we have no conflict of interest.

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