Revista Geoaraguaia
ISSN:2236-9716
Barra do Garças - MT
v.10, n.1, p.73-88. Jun-2020

TWO EXAMPLES FOR THE IMPACTS OF STREAM VALLEYS IN CYPRUS TO VEGETATION GEOGRAPHY: KARKOT STREAM AND KAMARA STREAM

DOIS EXEMPLOS DOS IMPACTOS NA VEGETAÇÃO CAUSADOS POR CORRENTES EM VALES NO CHIPRE: AS CORRENTES DE KARKOT E KAMARA

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Resumo:
Os córregos em Chipre sofrem influência de climas diferentes dos seus arredores devido às suas inclinações em direções diferentes, diferenças de altitude entre o leito do rio e as suas encostas assim como no fluxo de ar. A distinção no padrão geomorfológico dos vales e o clima associado e estes, permitiram o desenvolvimento de formação de diferentes espécies vegetais. Enquanto os microclimas formados nos vales garantem a sobrevivência de algumas espécies de plantas diferentes da cobertura vegetal em geral, eles também causam alterações no desenvolvimento fisiológico de algumas plantas. Geralmente, os vales em Chipre apresentam um impacto positivo na composição da vegetação. Esse impacto pode ser explicado sobretudo pelo clima úmido dessas áreas que permitem a ocorrência de ventos úmidos em direção ao interior. Os vales também têm um papel importante na proteção da vegetação natural de Chipre. Os vales de Chipre são áreas que acabam por oferecer condições de sobrevivência dessas formações vegetais originais, enquanto podem impactar positivamente no desenvolvimento e crescimento de algumas plantas como cedros (*Cedrus libani brevifolia*) no vale do cedro de Troodos; aveleiras (*Corryllus avellana*) no vale de Bitsilya; olmos cinzentos (*Ulmus canescens*), amieiro oriental (*Alnus orientalis*) em Diarizos e Stavros; e plátanos orientais (*Platanus orientalis*) no riacho Karkot e Kamara que sobreviveram devido às condições microclimáticas dos vales. Portanto, os vales localizados tanto em Troodos quanto no sopé norte das montanhas Kyrenia permitem uma maior exposição da incidência solar luz e maior umidade na região, o que mostram evidências dos impactos das formações em vales na diversificação vegetação e fitogeografia nessas regiões.
Palavras-Chave: Corrente de Karkot; Correntes em Vales; Fitogeografia; Vegetação; Chipre.

ABSTRACT
Streams in Cyprus embody different climates from their surroundings due to their slopes on different directions, height differences between the streambed and slopes, air stream within a valley, temperature differences caused by sunshine durations depending on sunrise and sunset locations. Distinction in the geomorphological pattern of valleys and associated climate allowed the formation of various plant communities. While the microclimates formed within valleys assure the survival of some different plant species apart from the general vegetation cover, they also cause different physiological development of some plants. Generally, valleys in Cyprus have positive

impacts on vegetation. Primarily due to their characteristics to form lower areas, they have mainly a positive impact through their holding humid weather and allow humid winds towards the interior. Valleys also have a major role in the protection of former natural vegetation of Cyprus. Nowadays, with the impact of global warming, the island with higher temperatures as well as aridification, encounters with the changes in climate and natural vegetation and even some plant species disappear. The valleys of Cyprus may become a place to survive and live for such plants while they may cause significant development and growth in size of some plants. Cedars (Cedrus libani brevifolia) in Cedar valley, Troodos, hazelnuts (Corryllus avellana) in Bitsilya valley, gray elms (Ulmus canescens,) Oriental alder (Alnus orientalis)in Diarizos and Stavros and oriental planes (Platanus orientalis) in Karkot stream and Kamara stream have survived due to the microclimatic conditions of valleys. Therefore, the valleys located both in Troodos and north foothills of the Kyrenia Mountains shed light to the times with more humidity and are the evidence for the future significance of the impacts of valleys on diversification through their vegetation geography.
Keywords: Karkot Stream; Valleys' stream; Phytogeography; Vegetation; Cyprus.

INTRODUCTION

Rugged topography leads to the emergence of a wide range of ecological conditions. This plant species that adapt itself to the ambient conditions are diversified. Growing plants under different environmental conditions also have developed different compounds within themselves (Duran, 2013). Valleys, one of the important elements of the rugged topography, represent long depressions that have geographically continuous descents with main lines (İzbırak1985). The importance of these valleys, which are formed by backwards erosion and the runoff, fed by rain, melting snow or underground sources, results from the openness of these trenches. Today's dry valleys that could not be explained by climatic conditions are forms that had been carved by streams and emerged from erosion during a much more humid period than today. Valleys that formed by the past and current climatological structure, due to their geomorphological structure, may show a different character of the climatic structure from the climate in the neighborhood. While the microclimates formed within valleys assure the survival of some different plant species apart from the general vegetation cover, they also cause different physiological development of some plants. These differences arise from slopes with different views in the valleys with their withdrawn structure, the height differences between streambeds and their slopes, airflows formed in the valleys, and temperature differences caused by sunshine durations depending on sunrise and sunset locations. Generally, valleys in Cyprus have positive impacts on vegetation. Primarily due to their characteristics to form lower areas, they have mainly a positive impact through their holding humid

weather and allow humid winds towards the interior. In addition, the structure in the alluvial valley floor, positively affects the growth of plants (İlseven,2017).

Valleys have also a major role in the protection of former natural vegetation of Cyprus. Nowadays, with the impact of global warming, the island with higher temperatures as well as aridification, encounters with the changes in climate and natural vegetation and even some plant species disappear. The valleys may become a place to survive and live for such plants while they may cause significant development and growth in size of some plants.

THE PURPOSE OF THE STUDY

In this study, the vegetation in Kemerli Stream (Kamara) Valley in the northern outskirts of Lapta Mountains and Karkot (Karkotis) Valley in the northern outskirts of the Troodos Mountains and the plant species forming the vegetation has been determined and listed and their difference between natural vegetation elements in the other geomorphological formations on the Island in terms of the ecological characteristics of the natural vegetation in these valleys was determined.

Geomorphological pattern of valleys and associated microclimate allowed the formation of various plant communities different from the near surroundings in the Karkot Stream Valley and Kemerli Stream Valley. In Cyprus, the positive and negative effects of the valleys on vegetation formations are another object of the article. Through these studies, three main vegetation formation has been identified in the Karkot Stream Valley and Kamara Valley Bed. These are the formations of forests, shrubs, and grass. It was aimed to determine the distribution of these formations, to explain the factors and circumstances that have caused these formations; namely to determine the effective ecological conditions, to study physiognomic and floristic features of different units which arise formations and the components of these formations and the effects of environmental conditions on the acquisition of these features

MATERIAL AND METHODS

Kemerli Stream (Kamara) Valley in the northern outskirts of Kyrenia Mountains and Karkot (Karkotis) Valley in the northern outskirts of the Troodos Mountains was chosen as study field. The material of the study is the plants showing natural spread in our study field. The basis of our research constitutes the fieldwork because these are not any previous (directly) research, article,

thesis, or report about the study fields where the plants had been collected. During our research, plants have been collected from different locations in different valleys in different times, the plant examples were numbered in the location, and they were subjected to pressing. During the naming process of the plant, Meikle's book called Flora of Cyprus, Viney's book called Flora of North Cyprus I and collections of Alevkayası and Near East University Herbarium were used. While collecting plant samples from the land, also body thickness and height of the tall plants were measured. While working on the plant distribution map of fields, 1/15000 scale forest management maps of the location from The Greek Cypriot administration and the Turkish Republic of Northern Cyprus forest departments, 1/5000 scale zoning plans of Lapta and Kakopetria Municipalities, taken from meteorological office, the data of Prodromos and Lapta stations were used. As the method, valleys and according to the physical structure, possible changes on the plant structures from the valleys were examined, the effects of slope, aspect, elevation, and shady spots on plant distribution were determined with computer support through digital maps.

VEGETATION AREAS IN CYPRUS

To explain the natural vegetation of Kemerli Stream and its surroundings, firstly the physical structure of Kyrenia Mountains where this valley is located, needs to be presented. The Geomorphological structure of the mountains is directly associated with plants which are located in this area. Kyrenia Mountains, parallel to the northern coast of Cyprus, extends in a 160 kilometers long east-west direction and in a straight line. One of the important features of these mountains is that they extend in a continuous east - west direction. (Yorgancıoğlu, 1998).

Ranging from Geçitköy Strait to Kyrenia Strait, Lapta Mountains are higher than the other parts of the Kyrenia Mountains. Its highest point with 1023 meters, Servili Hill is also the highest point of the North Cyprus. On the northern slopes of the Lapta Mountains, the annual rainfall is up to 500 mm because the mountains are high and they extend perpendicular to the prevailing wind direction. The lushest and the longest members of the natural vegetation are in this segment. Calabrian pines *(Pinus brutia*) and cypress (*Cupressus sempervirens)* constitute lovely stands here (Koday, 1998).

On the St. Hilarion Hill, where the St. Hilarion Castle is located (Bayrak Hill 725 m.), due to the excess of the steepness degree of crystallized limestone the vegetation is weak. It is the same on the north side of the Kıvanç Hill (946 m.) in the west; however, the terrain in southern and

western is available for cypress and Calabrian pine trees to become forests. On the nearby rocks, one of the endemic plants of Cyprus, St. Hilarion cabbage (*Brassica hilarionis*) is found. On the high slopes between Servili Hill and Bayrak Hill, eastern strawberry tree (*Arbutus andrachne*) are lush and tall. On the base of Dolinars, on relatively thick red Mediterranean Territories, excessive lengths of the tree formed shrubs of Arbutus andrachne and *Quercus coccifera* members are found. The reason for the Lapta Mountains to end on the northern coastline is the low-lying coastal plains. The most important of these plains from west to east is Gecitköy (Panagra), Karşıyaka, Lapta, Alsancak, Kyrenia, and Çatalkoy plains. While maquis elements were spreading in these plains, nowadays these are the places where residential areas or olive and citrus farming are common.

The maquis elements that have been identified in the northern slopes of the Lapta Mountains are; Sandalwood tree (*Arbutus andrachne*), carob (*Ceratonia siliqua*), turpentine (Pistacia terebinthus), mastic bush *(Pistacia lentiscus*), myrtle (*Myrtus communis*), wild olive*(Olea oleaster*), kermes oak (*Quercus coccifera*), hairy rockrose (*Cistus creticus*) small flowered rockrose (*Cistus parviflorus*), sage-leaved rockrose (*Cistus salviifolius*), sage (Salvia fruticosa), stryax (*Styrax officinalis*), laurel (*Laurus nobilis*), persian lilac (*Melia azedarach)*, buckthorn (*Rhamnus alaternus*).

The garrigue elements that have been identified on Lapta Mountains are, primarily poterium spinosum (*Sarcopoterium spinosum*), calycotome (*Calycotome villosa*), caper (*Capparis spinosa*), heather *(Erica sicula*), oregano (Origanum syriacum), kochia (*Origanum majorana*), white thyme (*Thymus capitatus*), sneakeroot (*Teucrium creticum, Teucrium divaricatum)*,thorny gorse (*Genista sphacelata*), lithodora (*Lithodora hispidula*), Cyprus golden- drop(*Onosma fruticosa, Onosma caespitosum, Onosma giganteum*) Spiny resth-harrow (*Ononis bio flora, Ononis ornithopodioides), Argyrolobim uniflorum*, thorny saltwort (*Noae to mucronata*), sage (*Salvia fruticosa*), oleander (*Nerium oleander*), styrax (*Styrax officinalis)*, mediterranean buckthorn (*Rhamnus alaternus*), Cyprus sainfoin (*Hedysarum cyprium)*, Cyprus sunrose = rockrose (*Helianthemum obtusifolium*).

Troodos Mountains is Cyprus' highest mountain mass. Unlike the Kyrenia Mountains, the Kyrenia Mountains have very high peaks. The highest point of the Troodos Mountains is Karlıdağ (Olympus 1952 m). 1617 meters of Adelfi, 1560 meters of Babutsa and 1425 meters of Mashera hills are also important in terms of heights (İlseven et all,2014).

Because of the mountains that occupy a large and high area, the average rainfall has been affected and this place has become the rainiest area of the island. Because of the rainfalls formed by humid air masses from the Mediterranean Sea that rise on the mountain slopes, west and northwest slopes of the Troodos mountains overlooking the sea are the wettest places of Cyprus (1000 mm and above)

Troodos Mountains, is widespread in west of the area on a straight line from Larnaca to Lefka. Unlike the Kyrenia Mountains, they do not spread as a long mountain range but they present a mass distribution. Instead of sudden increases, steep and strong slopes in the Kyrenia Mountains, here there are rises that are more gradual and descents are available. Because of the less inclined slopes, plants could hold on to on to more areas. Therefore, this region is where most of the natural vegetation is lush in Cyprus.

While Kyrenia Mountains are usually composed of sedimentary rocks and especially crystallized limestone, dolomite, marl and rocks such as sandstone, the main mass of Troodos Mountains is volcanic. The bulk forming rocks are; pillow lavas, andesites, basalts, gabbro, diorite, serpentine, etc. On volcanic main material; black pine (*Pinus nigra pallasiana)*, cedar (*Cedrus liban*i *brevifolia*), golden oak (*Quercus alnifolia*) and juniper (*Juniperus oxycedrus, Juniperus excelsa*) are spread. Places that are up to 1000 meters height from the sea are similar to the curved structure of the Kyrenia Mountains and generally, they consist of limestone. The formation time of these, places are the same as the Kyrenia Mountains at Neozoic time. The most common plant on these lands is calabrian pine (*Pinus brutia)*.

Troodos Mountains with 3200 square kilometers covers an area of almost equal size to Northern Cyprus. Descending from the summit in all directions, it reaches to Mesaoria Plain in east and north and to the Mediterranean Sea in the west and southwest. These sloping lands, harbor many streams. Kanlıdere (100km), Yialias (88Km), Serakhis (55Km), Dhiarizos (55Km), Kserobodamos (41.5Km), Ezusa (41Km), Karkot stream (30 Km), Yeşilırmak, Güzelyurt stream, Maden, Lefke, Çamlıdere and many small streams get their source from the Troodos Mountains (İlseven, Hıdırer, Tümer, 2014). Stream valleys there have conditions that are more favorable in terms of temperature compared to other areas in the Troodos Mountains. The bottom portion of these valleys is covered with thicker and more fertile soil compared to the slopes. Ground water is higher. With positive effects of these conditions that are suitable for the natural vegetation, valleys

contain the most lush, the tallest and broad-leaved trees compared to the surroundings. On the Troodos Mountains, alder (*Alnus orientalis*) and grey elm trees (*Ulmus canescens*) are common in the streams. In Stavros creek, well-preserved red trees almost reach to cover the valley. Between Evryho and Kakopetria, valley slopes and valleys in the region from the large Karkotis valley bed where Kakopetria Town is also found, up to Prodromos, contains the lushest and the tallest broad-leaved deciduous trees in Cyprus (Tsintides and Others, 2002). In this area, there are deciduous forest elements such as, oriental plane *(Platanus orientalis*), aspen (*Populus tremula*), Uzbeks poplar (*Populus usbekistanica*), alder (*Alnus orientalis*), birch (*Betula pendula*), and chestnut (*Castanea sativa*).

One of the common rocks in the Troodos ophiolite is serpentine. Soils formed because of chemical decomposition of serpentine contain heavy metals such as magnesium and they are shallow and stony. These soils are rich in heavy metals and they affect the diversity of plants on the slopes of the Troodos negatively. However, some endemic plants that adapt to these heavy metals are distributed in these areas (İlseven, 2014).

The forest elements detected in the Troodos Mountains plant area are, calabrian pine (*Pinus brutia*), common cypress (*Cupressus sempervirens*), pyramidal cypress (*Cupressus pyramidalis),* cedar (*Cedrus libani brevifolia),* black pine *(Pinus nigra),* Aleppo pine (*Pinus halepinsis),* stonepine (*Pinus pinea*), canary pine *(Pinus canariensis*), Phoenician juniper (*Juniperus phoenicea*), stinking juniper (Juniperus foetidissima), prickly juniper (*Juniperus oxycedrus),* ironwood=whistling pine(*Casuarina equisetifoli*), kallitris=sandarac tree (*Tetraclinis articulata*), giant redwood (*Sequoidendron giganteum*), coast redwood (*Sequoia sempervirens*), Abies cilcica, aspen (Populus tremula), Uzbeks poplar *(Populus usbekistanica,)* alder (*Alnus orientalis*), birch (*Betula pendula*), chestnut (*Castanea sativa*), maple (*Acer opticifolium*), grey elm (*Ulmus canescens*), oriental plane (*Platanus orientalis*), gall oak (*Quercus infectoria*) tall tamarisk (*Tamarix artculata*) , parkinsonia (Parkinsonia aculeata), ailanthus = tree of heaven (*Ailanthus altissima*) (Meikle,1985).

The maqui elements that have been identified on the plant area of the Troodos Mountains are; easten strawberry tree (*Arbutus andrachne*), western strawberry tree (*Arbutus unedo),* carob (*Ceratonia siliqua*), turpentine tree (*Pistacia terebinthus*), mastic bush (*Pistacia lentiscus),* myrtle (Myrtus communis), wil olive (*Olea Oleaster*), kermes oak (*Quercus coccifera*), rockrose (*Cistus*

creticus, cistus Parviflorus, Cistus salviifolius), sage (*Salvia fruticosa)*, stryax (styrax officinalis), laurel (*Laurus nobilis)*, persian lilac (*Melia azedarach)*, *buckthorn (Rhamnus alaternus).*

Garrigue and shrubs that were identified on the Troodos Mountains are, calycotome *(Calicotome villosa*), capers (*Capparis spinosa*), sarcopoterium (*Sarcopoterium spinosum*), anagyris (*Anagyris foetida),* genista (Genista sphacelate), rowan (Sorbus aria), hazel nut (*Coryllus avellana)*, castor oil Plant (*Ricinus communis)*, sumach (Rhus coriaria), heather (*Erica manipuliflora*), mock privet (*Phillyrea latifolia*), thyme (Thymus capitatus (*Litospermum hispidilum*), chaste tree (*Vitex agnus castus*), germander(Teucrium creticum), rosemary (*Rosmarinus oficinalis*), thyme (Thymus capitatus), licorice (Glycyrrhiza glabra), hawthorn (*Crataegus azarelus*), red hawthorn (*Crataegus monogyna*), sage (*Salvia grandiflora*), Cyprus sage (*Salvia cypria*) (Viney,1994, İlseven 2014)).

It is located on in the Mesaoria Plain, which is a 25-30 kilometers wide and 90-95 kilometers long depression between the Kyrenia Mountains and the Troodos Mountains.

On Mesaoria Plain's parts that are close to Kyrenia Mountains and the Troodos Mountains, where Değirmenlik flyshes are surfacing, shallow sandy chalky clay soils are found. Towards the more central areas of the plain, deep alluvial soils that eroded from the Kyrenia Mountains and the Troodos Mountains are found.

Mesaoria Plain is the place with the least precipitation in Cyprus. The average annual rainfall in this plain is about 335 mm. The places with the least precipitation in Cyprus are the Morphou Plain (285 mm) which is the western continuation of this plain and Dortyol which is in the middle section (278 mm). In this plain, which is dominated by such climatic conditions, steppes plants are the dominant plants. Some steppe species, which are bulbous, and tuber are perennial and they are waiting for the next year's vegetation circuit by protecting some of their organs. A part of them is annual plants and they are flourished in January-March, they begin to turn yellow in late spring and dry in summer. The most important step forming plants in Mesaoria; Mallow (*Malva sylvestris, Malva cretica, Malva aegyptia*), anemones (*Anemone blanda)*, mustard *(Sinapis arvensis*), Asparagus (*Asparagus acutifolius*), *Chrystanthemum segetum, chamomile Chrysanthemum coronarium,* sourgrass (*Oxalis pescaprae*), Cappers (*Capparis spinosa*),Mandrake (*Mandragora officinalis*), Boxwood = asphodel (*Asphodelus aestivus*),

prosopis(*Prosopis farcta)*, Scilla (*Urginea maritima*), Blue Star (*Scilla autumnalis*), Ornithogalum (*Ornithogalum umbellatum*), Allium trifoliatum (*Allium ampeloprasum*, *Allium nigrum*), Bongardia (*Bongardia chrysogontum*), poppy (*Papaver rhoeas*, *Papaver hybridum, Papaver setigerum*), Purple poppies (*Roemer hybrida*), white mignonette (*Reseda alba) (*Viney,1994, İlseven 2014*).*

In the steppes of Mesaoria, Jujubes which have gained drought resistance with their barbed structure = jujube (*Zizhypus lotus*) and prosopis (*Prosopis farcta*), drought resistant halophilous tamarisks in streams = (*Tamarix tetranda*, *Tamarix smyrnensis*) are found.

In Mesaoria, there are also trees that have been planted during the British period. The most important ones are; brought and planted eucalyptus with the aim of draining swamps during this period (*Eucalyptus camaldulensis, Eucalyptus tereticornis, Eucalyptus gomphocephala*), Especially planted on highways and along the old railway of Morphou - Famagusta, iron tree (*Casuarina equisetifolia),* planted the roadside acacia *(Acacia cyanophylla),* and jerusalem thorn *(parkinsonia aculeata)(İlseven,Bastas, 2018).*

In the Mesaoria, occasional afforestation work has been done by the forest office. However, most of the private property and extreme droughts in the Mesaoria has prevented the adoption of the desired results in afforestation. Hence, the consecutive dry period between the years 2008 -2009 has caused to drying by %25 on the cypress and calabrian pine (*Pinus brutia*) around Boğaz - Nicosia road. Towards the hills of the Kyrenia Mountains on the northern Mesaoria and the Troodos hills on the south of Mesaoria, plantations yielded better results and the calabrian pines there are taller and healthier than other trials of plantation.

NATURAL VEGETATION OF KEMERLI STREAM AND SURROUNDING AREA

The coastal areas of Cyprus where Mediterranean climate impact can be seen are the spreading areas of scrub plant components. In Mediterranean climate, the main Mediterranean shrub formation starting from Lapta - Alsancak coast, continues uninterrupted up to 400-500 meters. After these heights, the dominant species of the original Mediterranean; calabraian pine (*Pinus brutia*) and cypress (*Cupressus sempervirens*) spreads. The boundary of the calabrian pine and cypress forests and the maquis, which established an undisputed dominance on the study field, determines the impact area of the characteristic Mediterranean climate. Across the study area, the maquis constitute the underbrush flora of the calabrian pine (*Pinus brutia*) which is the main

characteristic of the Mediterranean forest. Especially on the calabrian pine destruction sites, the intensity of the scrub plants stand out (Ilseven,2017).

During the field study, tall plane trees over 300 have been identified in this valley. Some of these have a body thickness of 6 meters and a height of 40 meters. It was observed that in Kemerli stream, the maqui elements of kermes oak (*Quercus coccifera*), laurel *(Lauris nobilis*) and stryax (*Styrax officinalis*) grow up to 10 meters and create a trunk of 25-40 cm in diameter. On the high slopes of the Servili Hill on the North of the same valley, some of burning sandalwood during the Peace Operation in 1974 was 30-35 cm in diameter. During the short time after the last fire, re-settlement of the same trees and the fact that they reach 20-25 cm in diameter, is the proof that there will be an essential vegetation (İlseven, 2004). In a locality called the Armenian House on the Five Finger Mountains on south of Alevkayasi, the height and the body thickness of a sandalwood which is close to 200 years of age, with a 8.5 meters of body thickness; the kermes in the courtyard of a small church on the east of the Servili Hill, another content on Ayios Pavlos area with 10 meters in length and the height and thickness of nearby oaks and shrub-like trees like kermes oaks with approximately 20 meters height and a trunk circumference of 2.5 meters in Karaman, show that they can in fact survive in the lands as climax in the favorable climatic and topographic conditions if the maqui is not destroyed (İlseven 2004). On the eastern slopes of the Kamara Stream Valley, where the terrain of the area is appropriate, with the high degree of ghosting, maqui contents, and especially the cypress are (*Cupressus sempervirens*) taller and they have a sleeker body(ilseven,2017).

Kamara Stream Valley extends from the beach on the farther north, to the caves in the farther south between 0-220 meters. Maqui and garrigue formations start to spread from the right edge of the delta to the south, due to increasing of the elevation. Elm trees (*Ulmus canescens*) and tree of heaven (*Ailanthus altissima*) are partly included between Maquis and Gariggue. Identified on the study field, the shrubs and bushes types that consist maquis and gariggue formations are as follows; Maquis and gariggue formations: Wild olive (*Olea Oleaster*), carob (*Ceratonia Siliqua*), myrtle (*Myrtus communis*), kermes oak (*Quercus coccifera),* laurel (*Laurus nobilis*), rockrose (Cistus *creticus, cistus Parviflorus, cistus salviifolius)*, stryax (*Stryax officinalis*), turpentine tree= terebinth (*Pistacia tertebinthus*), lentisc = mastic bush (*Pistacia lentiscus*), white thyme (*Tymus vulgare*), oleander (*Nerium oleander),* eastern strawberry tree *(Arbutus andrachne),* bean trefoil

(*Anagyris foetida*), hawthorn (*Crataegus azarolus*), Lithodora (*Lithodor hispidula*), *wild pear* (*Pyrus syriaca*), (Vıney, 1994,1997,İlseven, 2004).

On the study field, the lush vegetation is on the merges slopes of Simi Stream and Kemerli Stream Valleys. In particular, here the height of oriental plane and cypress is about 40 meters. Along the valley bed, calabrian pine (*Pinus brutia*), cypress (*Cupressus sempervirens*), maple (*Acer optisifolium*), oriental plane (*Platanus orientalis*), elm (*Ulmus canescens*), allepo oak (*Quercus infectoria*) are common. Water-loving plants; giant reed (*Arundo donax*), bulrush, reedmace (*Typha domingensis*), blackberry (*Rubus Sanctus*), ivy (*Hedera helix).* Exotic species; paulownia (*Paulownia tomentosa*), bird-lime tree (Cordia myxa), redbud (Cercis ciliquastrum), common cypress *(Cupressus sempervirens*), Pyramidal cypress (*Cupressus pyramidalis*). Fruit trees that planted with agricultural purposes; Lemon (*Citrus lemon*), loquat (*Eriobotrya japonica*), common walnut (*Juglans regia*), Almond (*Prunus dulcis*), fig (*Ficus carica),* white mulberry (Morus Alba). Climbing plants; Virgin's bower (*Clematis cirrhosa*), honeysuckle (*Lunicera etrusca*). giant fennel *(Ferula communis*), daffodil (*Narcissus tazetta*), asphodel (*Asphodelus aestivus, Asphodelis fistulosa*), star of bethlehem (*Ornithogalum umbellatum*), sea squill (*Urginea maritima*), grape hyacinth (*Muscari Parviflorum*), asparagus (*Asparagus stipularis, Asparagus acutifolius*), capers (*Gapparis spino*sa), mallow (*Malva cretica*), anemone (*Anemone blanda*), lapsana (*Oxalis percarpe*), *Helichrysum conglobatum, Phagnalon rupestre, Arisarum vulgare, chamomile, chrysanthemum (Chrysantemum coronarium*), bermuda buttercup (*Oxalis pes-caprae*) as grass formations (Vıney, 1994,1997, İlseven,2004).

NATURAL VEGETATION OF KARKOTIS VALLEY AND THE SURROUNDING AREA

As known, climate changes that affect the majority of the world have occurred in Pleistocene and these climate changes have affected the ecological conditions, which determine the spread of plant species and communities. During Inter-glacial periods which were warmer than today, while high temperature requiring plants were spreading towards the poles, during the glacial periods which were colder than today, low temperature requiring plants have spread towards the equator (Dallman, 1998). During Glacial periods, some Euro-Siberian elements that has expanded to Toros Mountains in Turkey and to Troodos Mountains in Cyprus, settled on especially on the northern slopes of the mountains and they spread over a wide area. In interglacial periods, while high temperature requiring, southern origin plant species and communities that especially belong

to the Mediterranean Phytogeography region are spreading towards a wide range; northern origin plants maintain their presence by regressing their spreading areas towards relatively cool places, moist high northern slopes and isolated valley insides (Özalp,2000). During glacial periods, these plants continued their existence because they have satisfied their needs of low temperature and higher moist on relatively high part of the Troodos, insides of valleys on the northern slopes and particularly sheltered valleys opening to Morphou Bay. Cedar trees are relic in Cyprus. Cedar woods that moved to the Troodos Mountains during the Pleistocene climate changes, grows naturally on the area known as Paphos forest on Troodos Mountains foothills. On this place called Cedar Valley, the number of the magnificent trees is close to thirty thousand and they are under protection. Euro-Siberian elements that came to Cyprus during the glacial period had covered a much wider area after moving especially to the northwest slopes of the mountains. Northern plants, survived on secluded valleys and high slopes of misty and rainy mountains in the northwest part by narrowing their sites. In other words, Euro-Siberian elements were able to maintain their presence as relics because they have found lower temperatures, higher humidity in higher west-northwest slopes, and secluded valleys that open to Morphou Bay (Öztürk, 2002).

Taking the falling rain and snow on Troodos peaks and reaching up to Morphou Bay waters, Karkotis Valley Stream when examined as a whole with its natural structure; is a whole ecosystem that consists of a unique location, topography, different elevation and slope groups, geology, hydrology and a rich vegetation resulting from its climate and wide range of ecosystems. On Karkotis Valley, which is in the northern slopes of the Troodos Mountains, particularly in the vegetation period, it is beneficial for the plants that dominate wind directions are the north and northwest. Because during the summer when drought is severe, humid winds from the sea satisfy the need of water and create suitable conditions for plants. In addition, this case, among other factors, is remarkable in terms of showing the close relationship between the spread of cedar, elm, poplar, maple and the winds. Hence, the cedars, which are, not too far from the cedar valley, have a chance to develop on the northern slopes exposed to the moist wind during the vegetation period. North-directional winds in the Troodos Mountains have favorable conditions for plants. Having a cooling effect in summer, these northern winds have a positive effect on plants during this period because they reduce evaporation. Although it is thought that during the cold winter winds adversely

affect plants, the fact that plants are on their rest period eliminates the adverse conditions (Toroğlu & Ünaldı, 2008).

On the Troodos Mountains; Madari, Kyperounta, Chionistra (Olimpos), Pikromiloudi and Spilia are the places where black pine are commonly grow. In these areas, there are many 500-1000 year old black pine. According to the field studies, with the effect of the view, the trunk thickness is up to 3-4 meters and their heights are up to 40 meters in the south of the Kakopetria town and on the northern slopes of the Karkot valley. Young Sequoia that has been brought from abroad and planted on the road from Kakopetria to the peak of the Troodos Mountains, have already reached a height of 340 meters and a trunk thickness of 1 meter. Uzbeks poplars with a trunk thickness of 1.5 meters and a height of 50 meters are very outstanding. They are very common in the valleys on the northern and northwestern slopes of the Troodos Mountains. It is one of the most common and indigenous trees observed on the valley floors along with the oriental alder trees (Alnus orientalis). It is mostly common on the north-facing valleys of the Troodos Mountains, especially found abundantly along on the Karkotis Valley common silver birch (Betula pendula) was widely planted around Protromos, Pladaniya, Amiantihos (1000-1500 m), especially in streams and it has developed well (Tsintides et all 2002). Crataegus monogyna only grows in the Troodos Mountains on the island. It differs from Crataegus azarelus due to its shorter height and red colored fruit. Crataegus sinaia is probably a hybrid derived from them (İlseven, 2010).

Hazel Nuts (Coryllus avellana) grow naturally on the foothills of the Troodos, on the highest level in the forests and in stream edges. A relic plant nut located on the island during the Pleistocene climate changes. Similar examples are found on 1000 -1500 meters in Amanos and Binboğa and Aladaglar, in Turkey. In order to benefit from its goods, cultivation was practiced on it in Troodos Mountains. Individuals were identified in Malatya village and Green Heights Botanic Garden in Cyprus (İlseven,2004,Günal, 2013). Golden Oak, Cyprus (Golden) oak (Quercus Alnifolia) is spread over a wide area in Maschera. Golden oaks (Quercus Alnifolia) are together with black pines (Pinus nigra), prickly juniper (Juniperus oxycedrus) and Stinking juniper (Juniperus foeditissima) towards the Troodos peaks (1600 m) and they are solid on Adelfi and Madari. The most common solid golden oak groups are observed on the volcanic slopes around Madari and the slopes around the Kykkos Monastery (Tsintides and other 2002). The most common maquis member is Myrtle (Myrtus communis) on Troodos Mountains and especially the valley

insides in north-south direction on the Kyrenia mountains. They continue their existence while decreasing on the southern slopes of the streams.

Eastern Strawberry tree (Arbutus andrachne) show a primary formation feature on Karkotis and similar valleys where they are not destructed and on northern slopes, they are acquiring a shrub tree feature. The same applies for the north-facing slopes on Troodos Mountains and the slopes between Kykkos Monastery and Cedar Valley. Here, Eastern strawberry tree (Arbutus andrachne) with a trunk thickness of 50 cm and a height of 6-7 meters are very striking. A rare species in TRNC, Western strawberry tree (Arbutus unedo) grows naturally on the lands extending from Akama Peninsula to Arnavut Bay in Southern Cyprus (Tsintides et.all.2002).

On Troodos Mountains, valleys and the slopes facing the valleys cause plants to grow bigger than normal. Therefore, the most of the monumental trees on Troodos Mountains are located on valley beds and slopes of northern and northwestern direction. At. Mastic trees (Pistacia atlantica) over the age of 500 in the Troodos are under protection. Some mastic trees here are over the age of 1000 and they have been identified as monumental trees. In Kiti a 500 year old, in Simou a 1000 year old and in Apesia 1500-year-old trees are under protection as Monumental Trees. Giant Aleppo oaks (Quercus infectoria) in Kampos, Kato prygo, Pano Platres, Prodromi and Kouka, Laneta, Perra, Pedi, Fiti, Fterikoudi and Choulou have grown taller and bigger due to the favorable climate conditions on the slopes of the valley floors. Giant laurel (Laurus nobilis) in Omodos, Golden oak (Quercus alnifolia) in Apliki, Kermes oak (Quercus coccifera) in Kalopanagiodis, At. Mastic tree (Pistacia atlantica) in Apesia, Kritou, Marottou, Limnatis, Poli, Chrysochous and Simou and especially oriental plane (Platanus orientalis) in Nisou and Koliani are the best examples of the positive effects of valleys on the vegetation (Tsintides et all. 2002)

RESULTS

Chapter 82 “Law of Protection of the Public Streams” was implemented during British period in Cyprus (1930) and prohibited interference with the streams. Although it can fully or conditionally prohibit taking or moving stones, gravel, sand, soil or other substances from any stream or any part of the streams bed, edge or wall; spilling rubble, rubbish, trash or waste into any stream or into any bed, part, sides walls or any part of the stream, interferences to Kamara stream and Karkotis stream are still continuing. Lapta Municipality prevents the century-old sycamores and elms meeting with water by passing on the natural water flow in the stream to pipes. During

winter, Kyrenia governorship and municipality truncate all the trees and plants in order to fight with flood but natural structure is spoiled. It is the same for the Karkotis Stream. On 31 October 2010, the foundation of Soli (Solea) Dam which will be the 19. The Greek Cypriot Administration laid the foundation of the largest dam in the island. It was aimed for Soli Dam to spend 18 million Euros and collect 4.5 million of ton water. The main objective of the project has announced as, arranging Karkot (Karkotis) Stream waters which flow from the Troodos Mountains foothills towards Guzelyurt (Morphou) Bay, sending the water to five irrigation districts with its own power or by pumping and irrigating 8.000 hectares of land (İlseven,2016,Barışsever,2011). This dam will adversely affect the ecosystem in the Karkotis Valley region and primarily it will destroy broad-leaved trees on valley bed like; elm, sycamore, alder, poplar and coniferous trees like; calabrian pine, larch and cypress.

Generally, valleys in Cyprus have positive impacts on vegetation. Primarily due to their characteristics to form lower areas, they have mainly a positive impact through their holding humid weather and allow humid winds towards the interior. Valleys have also a major role in the protection of former natural vegetation of Cyprus. Nowadays with the impact of global warming, the island with higher temperatures as well as aridification, encounters with the changes in climate and natural vegetation and even some plant species disappear. The valleys may become a place to survive and live for such plants while they may cause significant development and growth in size for some plants. Therefore, the valleys located both in Troodos and north foothills of Kyrenia Mountains shed light to the times with more humidity and are the evidence for the future significance of impacts of valleys on diversification through their vegetation geography.

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