

**THE ACTION PLAN ON CONSERVATION OF CAMPUS BIODIVERSITY OF
MUĞLA SITKI KOÇMAN UNIVERSITY**

**PREPARED BY
MUĞLA SITKI KOÇMAN UNIVERSITY
APPLICATION AND RESEARCH CENTER OF BIODIVERSITY**

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The Action Plan on Conservation of Campus Biodiversity of Muğla Sitki Koçman University has been prepared with the demand of University Rectorate to be used in UI Green Metrics Application by Muğla Sitki Koçman University Application and Research Center of Biological Diversity.

Introduction of Campus has been obtained from The Head of Construction and Technical Works. Geological Structure of Campus has been prepared by Prof. Dr. Murat GÜL and Assist. Prof. Dr. Ceren KÜÇÜKUYSAL in Geology Engineering, Faculty of Engineering. experts in their fields have prepared biological Diversity of Campus; Macrofungus by Assoc. Prof. Dr. Hakan ALLI, Flora by Teaching Assistant Dr. Olcay CEYLAN, Invertebrate Animals by Prof. Dr. Hasan KOÇ and Assoc. Prof. Dr. Okan ÖZGÜL, Vertebrates by Assoc. Prof. Dr. Bülent YORULMAZ and Teaching Assistant Dr. Yasin İLEMİN.

The coordination of this Action Plan is under the responsibility of honoured Prof. Dr. Hüseyin ÇİCEK, the Rector of Muğla Sitki Koçman University and University Rectorate.

The Action Plan on Conservation of Campus Biodiversity aims to reach the objectives given below:

- 1- to document botanic and zoological biological richness
- 2- to document the endemic organisms
- 3- to determine the habitats to be protected
- 4- to determine the interaction of the forest over the campus and the campus biodiversity.
- 5- to determine the precautions towards the conservation of the forest in and over campus.
- 6- To coordinate all stakeholders acting at the University, initially Sustainable Green Campus Office and Application and Research Center of Biological Diversity to conserve campus biological diversity.

Introduction of Campus

University activities started in 1992, at the central campus at Kötekli, 6 km from Muğla city centre on 168.554 m² area transferred from Dokuz Eylül University. The campus is a neighbour to the Turkish pine forest. There is an artificial pool in front of the Faculty of Science on the campus. In addition, a pool to collect rainwater has been constructed on the campus. There is a total of 244.633 m² indoor space on the campus.



The Geology of the Campus

Considering the geological map prepared by MTA (General Directorate of Mineral Research and Exploration) for Muğla polje and its surroundings, including the campus area, Permian-Carboniferous schists, Triassic-Eocene aged dolomitic limestones, Lower-Middle Triassic meta-sandstone & meta-conglomerate and Liassic aged limestone dolomites, Lower Miocene aged limestones aged conglomerates, Upper Miocene-Pliocene aged conglomerate-sandstone-mudstone, Quaternary aged alluvial fan, talus and alluvium are observed (see Figure 1).

The unit, which is mapped as Permian schist (ps), quartzite and quartz schist (qs), consists of meta-pebble, schist-quartzite marbles towards the top is named as Kavaklıdere Group by Aktimur et al. (1996). (Aktimur et al., 1996; Göktaş, 1998).

Within the unit called Marçal group in the literature and shown as Middle Triassic-Liassic dolomites (t2j1-9-s) on the geological map, Campanian-Maastrichtian cherty limestones,

dolomite, fossiliferous limestones, flysch and clastic deposits were distinguished in the southeast of Yeniköy (Aktimur et al., 1996; Göktaş, 1998).

In the geological map, Lower-Middle Triassic sandstone-mudstone-limestone (t2-20-k) and Upper Triassic-Liassic pebble-sandstone-mudstone (t3j1-18-k) and Lower Triassic meta-sandstone-meta-pebble- meta-pelite (t1dm) units are thought to belong to the Ören Group (Aktimur et al., 1996; Göktaş, 1998).

Liassic aged dolomitic limestone, pelagic-semipelagic limestone (Mandalya Formation) unit, called Gereme Formation (Aktimur et al., 1996), is the unit on which the campus area was built. The unit, which is heavily fractured-cracked within the campus, consists of crystallized limestone and dolomitic limestones with karstic cavities of varying sizes and types.

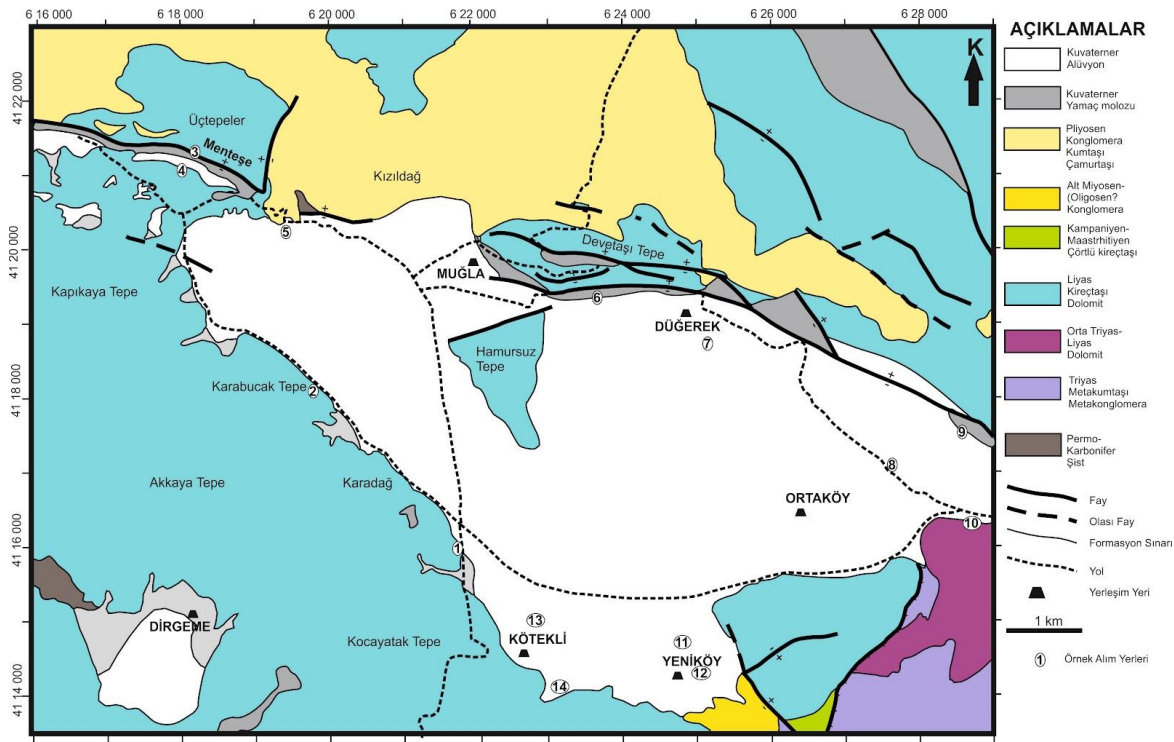


Figure 1 Geological map of Muğla polje (Göktaş, 1982; Konak et al., 1987; Aktimur et al., 1996, modified and obtained from the geological maps available at www.mta.gov.tr). (Küçükuysal, C., Rose, M., 2018)

The Neogene units unconformably overlying the older units listed above are the Lower Miocene-Aquitainian Kerme Formation (pebble stone, sandstone, mudstone) evaluated under the Akçay Group and the Yatağan Formation, which consists of the Pliocene aged pebble stone, sandstone, mudstone (pl-18-k) evaluated under the Muğla Group (Göktaş, 1998).

These units are covered with Quaternary aged alluvial fan, alluvium and slope debris (Gül et al., 2013, 2016). Red coloured lateritic soil is predominantly found in the campus area.

Biological Diversity of Campus

MACROFUNGUS

The total number of macro-fungus in Central Campus of Muğla Sıtkı Koçman University is 94, of which 22 species are edible, 23 species are poisonous, and 49 species are nonfood species.

The Conservation categories of The International Union for Conservation of Nature (IUCN) are given below:

EX- Extinct)

CR- Critically Endangered

EN- Endangered

VU- Vulnerable

LC- Least Concern

NT- Near Threatened

DD- Data Deficient

NE- Not Evaluated

MACROFUNGUS

IUCN CATEGORY

Ascomycota

Discinaceae

1. *Gyromitra esculenta* (Pers.) Fr.

Helvellaceae

2. *Dissingia leucomelaena* (Pers.) K. Hansen & X.H. Wang.

Morchellaceae

3. *Morchella esculenta* (L.) Pers. **EN**

Pezizaceae

4. *Peziza praetervisa* Bres.
5. *Sarcosphaera coronaria* (Jacq.) J. Schröt.

Pyronemataceae

6. *Geopyxis carbonaria* (Alb. & Schwein.) Sacc.

Tuberaceae

7. *Tuber aestivum* (Wulfen) Spreng.

Basidiomycota

Agaricaceae

8. *Agaricus comtulus* Fr. **CR**
9. *Baeospora myosura* (Fr.) Singer
10. *Cyathus olla* (Batsch) Pers.
11. *Infundibulicybe gibba* (Pers.) Harmaja
12. *Lepiota clypeolaria* (Bull.) P. Kumm.
13. *Lepiota erminea* (Fr.) P. Kumm.
14. *Lepiota ignivolvata* Bousset & Joss. ex Joss.
15. *Leucoagaricus leucothites* (Vitti) S. Wass.
16. *Macrolepiota excoriata* (Schaeff.) M.M. Moser
17. *Macrolepiota procera* (Scop.) Singer
18. *Melanoleuca melaleuca* (Pers.) Murrill
19. *Melanoleuca subalpina* (Britzelm.) Bresinsky & Stang **CR**
20. *Melanoleuca stridula* (Fr.) Singer
21. *Tulostoma squamosum* (J.F. Gmel.) Pers. **VU**
22. *Panaeolus ater* (Lge.) Kühn. & Romagn.
23. *Panaeolus subbalteatus* (Berk. & Br.) Sacc. **CR**
24. *Panaeolus olivaceus* F.H. Møller

25. *Panaeolus subbalteatus* (Berk. & Broome) Sacc.

26. *Clitocybe odora* (Bull.) P. Kumm.

27. *Lepista nuda* (Bull.) Cooke

Boletaceae

28. *Hemileccinum impolitum* (Fr.) Šutara

Lycoperdaceae

29. *Lycoperdon lividum* Pers.

30. *Lycoperdon molle* Pers.

Auriculariaceae

31. *Auricularia mesenterica* (Dicks.) Pers.

Bolbitiaceae

32. *Conocybe apala* (Fr.) Arnolds

Hydnaceae

33. *Cantharellus cibarius* Fr.

Inocybaceae

34. *Inosperma cervicolor* (Pers.) Matheny & Esteve-Rav.

35. *Inocybe godeyi* Gillet

Diplocystidiaceae

36. *Astraeus hygrometricus* (Pers.) Morgan

Entolomataceae

37. *Entoloma sericeum* Quéf. CR

Laetiporaceae

38. *Laetiporus sulphureus* (Bull.) Murrill

Polyporaceae

39. *Ganoderma applanatum* (Pers.) Pat.

Gloeophyllaceae

40. *Gloeophyllum sepiarium* (Wulfen) P. Karst. VU

Gomphidiaceae

41. *Chroogomphus rutilus* (Schaeff.) O.K. Mill.

Hydnangiaceae

42. *Laccaria proxima* (Boud.) Pat.

Hygrophoraceae

43. *Hygrocybe conica* (Schaeff.) P. Kumm.

Crepidotaceae

44. *Crepidotus mollis* (Schaeff.) Staude

Omphalotaceae

45. *Omphalotus illudens* (Schwein.) Bresinsky & Besl

Marasmiaceae

46. *Marasmius rotula* (Scop.) Fr.

Mycenaceae

47. *Mycena pura* (Pers.) P. Kumm.

48. *Mycena rosea* Gramberg

VU

49. *Mycena seynii* Quél.

CR

50. *Mycena strobilicola* J. Favre & Kühner

CR

Physalacriaceae

51. *Armillaria mellea* (Vahl) P. Kumm.

52. *Strobilurus tenacellus* (Pers.) Singer

Pleurotaceae

53. *Hohenbuehelia tremula* (Schaeff.) Thorn & G.L. Barron

54. *Pleurotus ostreatus* (Jacq.) P. Kumm.

Pluteaceae

55. *Volvopluteus gloiocephalus* (DC.) Vizzini, Contu & Justo

Polyporaceae

56. *Fomes fomentarius* (L.) Fr.

57. *Lentinus tigrinus* (Bull.) Fr.

58. *Cerioporus squamosus* (Huds.) Quél.

59. *Trametes versicolor* (L.) Lloyd

60. *Trametes trogii* Berk.

61. *Trichaptum abietinum* (Pers. ex J.F. Gmel.) Ryvar den

EN

Psathyrellaceae

62. *Coprinopsis atramentaria* (Bull.) Redhead, Vilgalys & Moncalvo

63. *Coprinellus disseminatus* (Pers.) J.E. Lange

64. *Coprinellus micaceus* (Bull.) Vilgalys, Hopple & Jacq. Johnson

65. *Coprinopsis picacea* (Bull.) Redhead, Vilgalys & Moncalvo

VU

66. *Psathyrella prona* (Fr.) Gillet

67. *Psathyrella candolleana* (Fr.) Maire

Rhizopogonaceae

68. *Rhizopogon luteolus* Fr.

69. *Rhizopogon roseolus* (Corda) Th. Fr.

Russulaceae

70. *Lactarius chrysophyllus* Z. Schaef.

CR

71. *Lactarius deliciosus* (L.) Gray

72. *Lactarius deterrimus* Gröger

73. *Lactarius semisanguifluus* R. Heim & Leclair

74. *Russula squalida* Peck

75. *Russula delica* Fr.

76. *Russula turci* Bres.

VU

Schizophyllaceae

77. *Schizophyllum commune* Fr

Sclerodermataceae

78. *Pisolithus arhizus* (Scop.) Rauschert

Stereaceae

79. *Stereum hirsutum* (Willd.) Pers.

Hymenogastraceae

80. *Galerina patagonica* Singer

81. *Hebeloma sarcophyllum* (Peck) Sacc.

Strophariaceae

82. *Pholiota carbonaria* (Fr.) Singer

VU

83. *Deconica pratensis* (P.D. Orton) Noordel.

VU

84. *Rhodocybe truncata* (Schaeff.) Singer

85. *Psilocybe coronilla* (Bull.) Noordel

Suillaceae

86. *Suillus bellini* (Inzenga) Kuntze

87. *Suillus collinitus* (Fr.) Kuntze

CR

88. *Suillus granulatus* (L.) Roussel

Tremellaceae

89. *Tremella mesenterica* Retz.

VU

Tricholomataceae

90. *Tricholoma batschii* Gulden

CR

91. *Tricholoma terreum* (Schaeff.) P. Kumm.

Tubariaceae

92. *Cyclocybe cylindracea* (D.C.) Vizzini & Angelini

93. *Tubaria furfuracea* (Pers.) Gillet

94. *Tubaria romagnesiana* Arnolds

FLORA

To identify flora of Muğla Sıtkı Koçman University Menteşe Campus, 1015 samples have been evaluated, and 376 taxa have been identified belonging to 62 families. The number of endemic species in the Menteşe Campus is 13. The plant species in the campus and their IUCN categories are given below.

PLANTS

IUCN CATEGORY

Pteridophyta

Aspleniaceae

Asplenium ceterach L.

Dryopteridaceae

Dryopteris pallida (Bory) Fomin subsp. *pallida*

Spermatophyta

Gymnospermae

Pinaceae

Pinus brutia Ten. var. *butia*

Cupressaceae

Cupressus sempervirens L.

Juniperus oxycedrus L. subsp. *oxycedrus*

Angiospermae

Magnoliopsida (Dicotyledones)

Ranunculaceae

Nigella arvensis L. var. *glauca* Boiss.

Delphinium peregrinum L.

Anemone blanda Schott & Kotschy

Anemone coronaria L.

Clematis cirrhosa L.

Ranunculus constantinopolitanus (DC.) d'Urv

Ranunculus paludosus Poir.

Ranunculus sprunerianus Boiss.

Ranunculus arygreus Boiss.

Ranunculus arvensis L.

Ranunculus ficaria L. subsp. *ficariiformis* Raay & Fouc.

Berberidaceae

Leontice leontopetalum L.

Papaveraceae

Glaucium flavum Crantz.

Papaver rhoeas L.

Hypecoum pseudograndiflorum Petrovic

Fumaria officinalis L. subsp. *officinalis*

Fumaria parviflora Lam.

Brassicaceae (Cruciferae)

Sinapis alba L. subsp. *alba*

Sinapis arvensis L.

Raphanus raphanistrum L. subsp. *raphanistrum*

Calepina irregularis (Asso) Thell.

Lepidium draba L.

Lepidium chalepense L.

Isatis glauca Aucher ex Boiss. subsp. *glauca*

Isatis tinctoria L. subsp. *tomentella* (Boiss.) Davis

Isatis tinctoria L. subsp. *corymbosa* (Boiss.) Davis

Iberis carica Bornm., Endemic.

NT

Biscutella didyma L.

Microthlipsis perfoliatum (L.) F.K.Mey.

Capsella bursa-pastoris (L.) Medik.

Neslia paniculata (L.) Desv. subsp. *thracica* (Velen) Bornm

Bunias erucago L.

Lobularia maritima (L.) Desv.

Alyssum smyrnaeum C.A.Mey.

Alyssum fulvescens Sibth. & Sm. var. *fulvescens*

Alyssum simplex Rudolph

Alyssum armenum Boiss.

Clypeola jonthlaspi L.

Draba verna L.

Arabis verna (L.) R.Br.

Erysimum caricum Boiss., Endemic.

CR

Erysimum crassipes Fisch. & Mey

Sisymbrium altissimum L.

Capparaceae

Capparis orientalis Veill

Cistaceae

Cistus creticus L.

Helianthemum ovatum Dun.

Helianthemum salicifolium (L.) Mill.

Portulacaceae

Portulaca oleracea L.

Caryophyllaceae

Minuartia hybrida (Vill.) Schischk. subsp. *turcica* McNeill

Cerastium brachypetalum Pers. subsp. *roeseri* (Boiss. & Heldr) Nyman

Moenchia mantica (L.) Bartl.

Telephium imperati L. subsp. *orientale* (Boiss.) Nyman

Dianthus tripunctatus Sm.

Dianthus orientalis Adams

Dianthus zonatus Fenzl var. *zonatus*

Velezia hispida Boiss., Endemic.

LC

Velezia rigida L.

Silene italica (L.) Pers. subsp. *italica*

Silene vulgaris (Moench) Garcke var. *vulgaris*

Silene behen L.

Silene cariensis Boiss. subsp. *muglae* Vural & Dönmez. Endemic.

CR

Silene dichotoma Ehrh. subsp. *dichotoma*

Silene gallica L.

Silene subconica Friv.

Agrostemma brachyloba (Fenzl) K.Hammer

Polygonaceae

Rumex tuberosus L. subsp. *tuberosus*

Chenopodiaceae

Chenopodium opulifolium Schrad.

Suaeda acuminata Moq.

Tamaricaceae

Tamarix hampeana Boiss. & Heldr

Guttiferae (Hypericaceae)

Hypericum perforatum L., subsp. *veronense* (Schrank) H.Linb.

Malvaceae

Hibiscus trionum L.

Malva sylvestris L.

Alcea biennis Winterl

Linaceae

Linum nodiflorum L.

Geraniaceae

Geranium lucidum L.

Geranium purpureum Vill.

Geranium rotundifolium L.

Geranium columbinum L.

Geranium dissectum L.

Geranium tuberosum L.

Erodium botrys (Cav.) Bertol.

Erodium malacoides (L.) L'Herit.

Erodium cicutarium (L.) L'Herit. subsp. *cutarium*

Erodium acaule (L.) Becherer & Thell.

Zygophyllaceae

Tribulus terrestris L.

Rhamnaceae

Paliurus spina-christi Mil.

Rhamnus rhodopea Velenovsky

Anacardiaceae

Pistacia lentiscus L.

Pistacia palaestina Boiss.

Fabaceae (Leguminosae)

Anagyris foetida L.

Lupinus angustifolius L. subsp. *angustifolius*

Astragalus hamosus L.

Astragalus condensatus Ledeb, Endemic.

LC

Vicia cracca L. subsp. *cracca*

Vicia villosa Roth subsp. *villosa*

Vicia cassia Boiss.
Vicia palaestina Boiss.
Vicia articulata Hornem.
Vicia peregrina L.
Vicia hybrida L.
Vicia cuspidata Boiss.
Vicia sativa L. subsp. *incisa* (Bieb) Arc. var. *cordata* (Wulfen ex Hoppe) Arc
Lathyrus inconspicuus L.
Lathyrus setifolius L.
Lathyrus cicera L.
Lathyrus sativus L.
Lathyrus aphaca L. var. *pseudoaphaca* (Boiss.) Davis.
Pisum sativum L. subsp. *elatius* (Bieb.) Aschers. & Graebn. var. *elatius*
Trifolium uniflorum L.
Trifolium repens L. var. *repens*
Trifolium grandiflorum Schreb
Trifolium campestre Schreb. subsp. *campestre*
Trifolium physodes Stev. Ex Bieb. var. *physodes*
Trifolium tomentosum L. var. *tomentosum*
Trifolium stellatum L. var. *stellatum*
Trifolium lappaceum L
Trifolium cherleri L.
Trifolium arvense L. var. *arvense*
Trifolium angustifolium L.
Trifolium leucanthum Bieb.
Trifolium scutatum Boiss.
Melilotus albus Desr.
Trigonella spicata Sibth. & Sm.
Trigonella coerulescens (Bieb.) Hal.
Trigonella gladiata Stev.
Trigonella cariensis Boiss.
Medicago phrygia (Boiss. & Balansa) E.Small.
Medicago orbicularis (L.) Bart
Medicago sativa L. subsp. *sativa*

Medicago minima (L.) Bart. var. *minima*

Medicago disciformis DC.

Lotus angustissimus L.

Lotus macrotrichus Boiss.

Hymenocarpus circinnatus (L.) Savi

Anthyllis vulneraria L. subsp. *praepropera* (Kerner) Bornm.

Hippocrepis emerus (L.) Lassen subsp. *emeroides* (Boiss. & Spruner) Lassen

Coronilla scorpioides (L.) Koch.

Securigera cretica (L.) Lassen

Hippocrepis unisiliquosa L. subsp. *bisiliqua* (Forssk.) Bornm.

Onobrychis caput-galli (L.) Lam.

Onobrychis aequidentata (Sibth. & Sm.) d'Urv.

Rosaceae

Prunus spinosa L.

Amygdalus communis L.

Rubus canescens DC. var. *canescens*,

Potentilla recta L.

Sanguisorba minor Scop. subsp. *minor*

Rosa gallica L.

Crataegus azarolus L. var. *azarolus*

Crataegus monogyna Jacq. subsp. *monogyna*

Pyrus communis L. subsp. *caucasica* (Fed.) Browicz

Pyrus amygdaliformis Vill. var. *amygdaliformis*

Pyrus amygdaliformis Vill. var. *lanceolata* Diap.

Myrtaceae

Myrtus communis L. subsp. *communis*

Punicaceae

Punica granatum L.

Lythraceae

Lythrum tribracteatum Salzm.

Crassulaceae

Sedum album L.

Saxifragacea

Saxifraga cymbalaria L.

Apiaceae (Umbelliferae)

Eryngium campestre L. var. *campestre*

Lagoecia cuminoides L.

Scandix iberica Bieb.

Scandix pecten-veneris L.

Scandix australis L. subsp. *grandiflora* (L.) Thell.

Smyrniium rotundifolium Mill.

Bunium ferulaceum Sibth. & Sm.

Cachrys crassiloba (Boiss.) Meikle

Falcaria vulgaris Bernh.

Ferulago humilis Boiss., Endemic. **LC**

Opopanax hispidus (Friv.) Gris

Malabaila secacul (Mill.) Boiss.

Ormosciadium aucheri Boiss.

Tordylium aegaeum Runem.

Thapsia garganica L.

Torilis nodosa (L.) Gaertn.

Torilis arvensis (Huds.) Link. subsp. *elongata* (Hoffmanns & Link.) Cannon

Torilis ucranica Spreng.

Torilis leptophylla (L.) Reichb

Caucalis platycarpos L.

Turgenia latifolia (L.) Hoffm.

Daucus carota L.

Caprifoliaceae

Valeriana dioscoridis Sm.

Valerianella echinata (L.) DC.

Valerianella orientalis (Schecht.) Boiss. & Bal.

Valerianella coronata (L.) DC.

Valerianella vesicaria (L.) Moench

Valerianella muricata (Stev.ex Roem.&Schult) W.H.Baxt.

Scabiosa argentea L.

Scabiosa sicula L.

Scabiosa calocephala Boiss.

Pterocephalus plumosus (L.) Coulter

Asteraceae (Compositae)

Xanthium orientale L. subsp. *italicum* (Moretti) Greuter

Pulicaria dysenterica (L.) Bernh.

Conyza canadensis (L.) Cronquist

Bellis perennis L.

Doronicum orientale Hoffm.

Senecio bicolor (Willd.) Tod. subsp. *bicolor*

Anthemis cretica L. subsp. *albida* (Boiss.) Grierson

Anthemis chia L.

Anthemis pseudocotula Boiss.

Anthemis macrotis (Rech.f) Oberpr. & Vogt.

Cladanthus mixtus (L.) Oberpr. & Vogt.

Onopordum illyricum L.

Picnomon acarna (L.) Cass.

Carduus pycnocephalus L. subsp. *pycnocephalus*

Carduus pycnocephalus L. subsp. *albidus* (Bieb.) Kazmi

Jurinea mollis (L.) Reichb.

Centaurea solstitialis L. subsp. *solstitialis*

Centaurea urvillei DC. subsp. *urvillei*

Centaurea urvillei D.C. subsp. *stepposa* Wagenitz

Cyanus segetum Hill.

Crupina crupinastrum (Moris) Vis.

Carthamus dentatus Vahl

Cardopatum corymbosum (L.) Pers.

Echinops spinosissimus Turra subsp. *spinosissimus*

Scolymus hispanicus L. subsp. *hispanicus*

Cichorium intybus L.

Scorzonera cana (C.A.Mey.) Griseb. var. *jacquiniana* (W. Koch) Chamb.

Scorzonera sublanata Lipsch.

Tragopogon porrifolius L.

Tragopogon porrifolius L. subsp. *longirostris* (Sch. Bip.) Greuter

Tragopogon dubius Scop

Leontodon tuberosus L.

Urospermum picroides (L.) F.W Schmidt

Rhagadiolus stellatus (L.) Gaertn.

Sonchus asper (L.) Hill subsp. *glaucescens* (Jordan) Ball.

Pilosella piloselloides (Vill.) Sojak subsp. *piloselloides*

Lactuca serriola L.

Taraxacum serotinum (Waldst. & Kit.) Poiret

Taraxacum macrolepium Schischkin

Chondrilla juncea L.

Crepis foetida L. subsp. *foetida*

Crepis foetida L. subsp. *rhoeadifolia* (Bieb.) Celak.

Crepis sancta (L.) Babcock

Crepis vesicaria L. subsp. *vesicaria*

Campanulaceae

Campanula drabifolia Sm.

Legousia falcata (Ten.) Fritsch

Legousia hybrida (L.) Delarbre

Legousia speculum-veneris (L.) Chaix

Legousia pentagonia (L.) Thell.

Primulaceae

Anagallis arvensis L. var. *caerulea* (L.) Gouan

Styracaceae

Styrax officinalis L.

Oleaceae

Jasminum fruticans L.

Phillyrea latifolia L.

Apocynaceae

Periploca graeca L. var. *graeca*

Vincetoxicum canescens (Willd.)Decne subsp. *canescens*

Convolvulaceae

Convolvulus arvensis L.

Convolvulus galaticus Rostan ex Choisy

Calystegia silvatica (Kit.)Griseb

Boraginaceae

Heliotropium lasiocarpum Fisch. & Mey.

Heliotropium hirsutissimum Grauner

Myosotis minutiflora Boiss. & Reuter

Paracaryum aucheri (DC. & A.DC.) Boiss.

Buglossoides arvensis (L.) Johnston subsp. *Sibthorpiana* (Griseb.) R.Fern.

Echium italicum L.

Echium plantagineum L.

Anchusa leptophylla Roemer & Schultes subsp. *leptophylla*

Anchusa hybrida Ten.

Anchusa azurea Miller var. *azurea*

Anchusa variegata (L.) Lehm.

Alkanna tinctoria (L.) Tausch subsp. *tinctoria*

Alkanna tinctoria (L.) Tausch subsp. *glandulosa* Hub.- Mor., Endemic. NT

Solanaceae

Solanum americanum Mill.

Solanum pseudocapsicum L.

Scrophulariaceae

Verbascum cariense Hub. - Mor., Endemic. NT

Verbascum mucronatum Lam.

Verbascum glomeratum Boiss.

Verbascum splendidum Boiss.

Scrophularia lucida L.

Acanthaceae

Acanthus spinosus L.

Verbenaceae

Verbena officinalis L. var. *officinalis*

Lamiaceae (Labiatae)

Vitex agnus-castus L.

Ajuga orientalis L.

Ajuga chamaepitys (L.) Schreber subsp. *chia* (Schreber) Arcangeli

Teucrium chamaedrys L. subsp. *chamaedrys*

Rosmarinus officinalis L.

Phlomis bourgaei Boiss.

Lamium amplexicaule L., var. *amplexicaule*

Stachys cretica L. subsp. *smyrnaea* Rech. f.

Prunella vulgaris L.

Origanum onites L.

Thymus longicaulis C.Presl subsp. *longicaulis*

Thymus longicaulis C.Presl subsp. *chaubardii* (Rchb.f.) Jalas

Thymbra spicata L. var. *intricata* (P.H. Davis) R.Morales

Mentha pulegium L.

Ziziphora capitata L.

Ziziphora tenuior L.

Salvia fruticosa Mill.

Salvia tomentosa Mill.

Salvia nutans L.

Salvia verbenaca L.

Plantaginaceae

Linaria simplex (Willd.) D.C.

Veronica grisebachii S.M.Walters

Veronica cymbalaria Bodard

Veronica lycica E.Lehm., Endemic.

LC

Plantago coronopus L. subsp. *commutata* (Guss.) Pilger

Plantago lanceolata L.

Plantago lagopus L.

Thymelaeaceae

Daphne sericea Vahl subsp. *sericea*

Daphne gnidioides Jaub. & Spach

Santalaceae

Osyris alba L.

Euphorbiaceae

Chrozophora tinctoria (L.) A.Juss.

Euphorbia helioscopia L. subsp. *helioscopia*

Euphorbia tauriensis All.

Euphorbia falcata L. subsp. *falcata*

Euphorbia falcata L. subsp. *macrostegia* (Bornm.) O. Schwarz, Endemic.

LC

Euphorbia rigida Bieb.

Urticaceae

Parietaria cretica L.

Moraceae

Morus nigra L.

Ficus carica L. subsp. *carica*

Juglandaceae

Juglans regia L.

Fagaceae

Quercus infectoria Olivier subsp. *veneris* (A.Kern.) Meikle

Quercus aucheri Jaub. & Spach, Endemic,

LC

Quercus coccifera L.

Salicaceae

Salix alba L. subsp. *alba*

Rubiaceae

Sherardia arvensis L.

Crucianella imbricata Boiss.

Asperula arvensis L.

Galium heldreichii Hal.

Galium spurium L. subsp. *spurium*

Galium brevifolium Sm. subsp. *insulare* Ehrend. & Schönb.-Tem.

Liliopsida (Monocotyledones)

Araceae

Dracunculus vulgaris Schott

Asparagaceae

Ruscus aculeatus L.

Asparagus acutifolius L.

Amaryllidaceae

Allium hirtovaginum Cand.

Allium ampeloprasum L.

Allium sphaerocephalon L. subsp. *sphaerocephalon*

Ornithogalum narbonense L.

Ornithogalum umbellatum L.

Muscari comosum (L.) Miller

Liliaceae

Fritillaria bithynica Baker

Fritillaria sibthorpiana (Sm.) Baker subsp. *enginiana* Byfield & N.Özhatay, Endemic. EN

Tulipa orphanidea Boiss. ex Helder.

Gagea graeca (L.) Irmsch.

Gagea peduncularis (J. & C. Presl) Pascher

Colchicaceae

Colchicum variegatum L.

Iridaceae

Gynandriris sisyrinchium (L.) Parl.

Crocus fleischeri Gay

Crocus cancellatus Herbert subsp. *lycius* Mathew, Endemic. NT

Crocus cancellatus Herbert subsp. *mazziaricus* (Herbert) Mathew

Romulea ramiflora Ten. subsp. *ramiflora*

Romulea columnae Seb.& Mauri subsp. *columnae*

Gladiolus illyricus W. Koch

Orchidaceae

Cephalanthera rubra (L.)L.C. M.Richard.

Ophrys ferrum-equinum Desf.

Anacamptis pyramidalis (L.) L.C. M. Richard

Orchis anatolica Boiss.

Juncaceae

Juncus acutus L. subsp. *acutus*

Cyperaceae

Cyperus rotundus L.

Carex flacca Schreber subsp. *erythrostachys* (Hope) Holub

Poaceae (Gramineae)

Aegilops caudata L.

Aegilops umbellulata Zhukovsky

Triticum aestivum L.

Hordeum murinum L. subsp. *leporinum* (Link) Arc.

Hordeum bulbosum L.

Bromus hordeaceus L. subsp. *hordeaceus*

Bromus arvensis L.

Bromus lanceolatus Roth

Bromus sterilis L.

Avena barbata Pott ex Link subsp. *barbata*

Milium pedicellare (Bornm.) Roshev.

Phleum exaratum Griseb subsp. *exaratum*

Phleum boissieri Bornm.

Lolium rigidum Gaudin var. *rigidum*, 38, O.805, 21.06.04, Akd. Ele.

Poa bulbosa L., 6, O.240, 13.04.04.

Dactylis glomerata L. subsp. *hispanica* (Roth) Nyman

Briza maxima L.

Echinaria capitata (L.) Desf.

Stipa ehrenbergiana Trin. & Rupr.

Cynodon dactylon (L.) Pers. var. *villosus* Regel

Echinochloa crus-galli (L.) P. Beauv.

Setaria viridis (L.) P.Beauv.

INVERTEBRATE ANIMALS

Insect species have been researched in Muğla Sıtkı Koçman University Menteşe Campus, and 45 insect species are identified. Determined data belonging to Insects are given below.

INVERTEBRATE ANIMALS

IUCN CATEGORY

Insects

Diptera

Tipulidae

<i>Nephrotoma appendiculata appendiculata</i> (Pierre, 1919)	NE
<i>Nephrotoma scalaris</i> (Meigen, 1818)	NE
<i>Nephrotoma theowaldi</i> Oosterbroek, 1978	NE
<i>Tipula (Lunatipula) bimacula</i> Theowald, 1980	NE
<i>Tipula (Lunatipula) decolor</i> Mannheims, 1963	NE
<i>Tipula (Lunatipula) dedecor</i> Loew, 1873	NE
<i>Tipula (Lunatipula) franzressli</i> Theischinger, 1982	NE
<i>Tipula (Lunatipula) furcula</i> Mannheims, 1954	NE
<i>Tipula (Lunatipula) helvola</i> Loew, 1873	NE
<i>Tipula (Lunatipula) mendli</i> Martinovsky, 1976	NE
<i>Tipula (Lunatipula) ornithogona</i> Theischinger, 1982	NE
<i>Tipula (Lunatipula) soosi izmirensis</i> Theischinger, 1987	NE
<i>Tipula (Lunatipula) vermooleni</i> Theischinger, 1987	NE
<i>Tipula</i> (s.str.) <i>orientalis</i> Lackschewitz, 1930	NE

Limoniidae

<i>Dactylolabis jonica</i> Lackschewitz, 1940	NE
<i>Pseudolimnophila sepium</i> (Verrall, 1886)	NE
<i>Dicranoptycha</i> (s.str.) <i>fuscescens</i> (Schummel, 1829)	NE
<i>Dicranomyia</i> (s.str.) <i>mitis</i> (Meigen, 1830)	NE
<i>Dicranomyia</i> (s.str.) <i>modesta</i> (Meigen, 1818)	NE
<i>Dicranomyia (Glochina) sericata</i> (Meigen, 1830)	NE
<i>Limonia macrostigma</i> (Schummel, 1829)	NE
<i>Limonia nubeculosa</i> Meigen, 1804	NE
<i>Limonia phragmitidis</i> (Schrank, 1781)	NE

Bibionidae

<i>Bibio hortulanus</i> (Linnaeus, 1758)	NE
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Dermaptera

Forficula auricularia Linnaeus, 1758 = Earwig NE

Hymenoptera

Apis mellifera Linnaeus, 1758 = Bee NE

Lepidoptera

Nymphalidae

Kirinia roxelana (Cramer, 1777) Lattice brown LC

Hipparchia statilinus Hufnagel, 1766 = Tree grayling LC

Limenitis reducta Staudinger, 1901 = Southern white admiral LC

Nymphalis egea (Cramer, 1777) = Anatolian tatty LC

Vanessa atalanta (Linnaeus, 1758) = Red admiral LC

Vanessa cardui (Linnaeus, 1758) = Thistle butterfly LC

Issoria lathonia (Linnaeus, 1758) = Queen of spain fritillary NE

Papilionidae

Papilio machaon Linnaeus, 1758 = Papilio machaon LC

Iphiclides podalirius Linnaeus, 1758 = Scarce swallowtail

Archon apollinus (Herbst, 1789) = False Apollo LC

Pieridae

Pieris brassicae (Linnaeus, 1758) = Cabbage butterfly NE

Colias croceus (Geoffroy, 1785) = Clouded yellow LC

Pontia edusa Fabricius, 1777 = Eastern bath white

Hesperiidae

Thymelicus sylvestris (Poda, 1761) = Small skipper NE

Carcharodus alceae (Esper, 1780) = Mallow skipper NE

Thaumetopoeidae

Thaumetopea pityocampa Denis & Schiffermüller, 1775 = Pine processionary beetle

(Hemiptera)

Gerris lacustris (Linnaeus, 1758) = Gerridae NE

Gerris thoracicus Schummel, 1832 = Gerridae NE

VERTEBRATES

As a result of research on Vertebrates in Muğla Sıtkı Koçman University Campus area, three frogs belong to Amphibia, 13 reptiles belong to Reptilia, 12 birds belong to Aves, and seven mammals belonging to Mammalia have been identified.

In particular, *Lyciasalamandra flavimembris ilgazi* subsp. nov, the subspecies of Marmaris Salamander, *Lyciasalamandra flavimembris* (Mutz & Steinfartz, 1995), belonging to class Amphibia, is endemic to campus area of Muğla Sıtkı Koçman University and Kötekli.

VERTEBRATES

IUCN

CATEGORY

(Amphibia)

<i>Bufo bufo</i> (Linnaeus, 1758) = Toad, Warty Frog	LC
<i>Bufo viridis</i> (Laurenti, 1768) = Night Frog	LC
<i>Lyciasalamandra flavimembris</i> (Mutz & Steinfartz, 1995) = Marmaris Salamander	EN

(Reptilia)

<i>Testudo graeca</i> (Linnaeus, 1758) = Common tortoise	VU
<i>Agama stellio</i> (Boulenger 1885) = Thorny lizard	LC
<i>Chamaeleo chamaeleon</i> (Linnaeus, 1758) = Chameleon	LC
<i>Hemidactylus turcicus</i> (Linnaeus, 1758) = Broad-toed lizard	LC
<i>Ablepharus kitaibelii</i> (Bibron & Bory ST-Vincent 1833) = Slender lizard	LC
<i>Mabuya aurata</i> (Andersson 1900) = Chunky lizard	LC
<i>Lacerta trilineata</i> (Bedriaga 1886) = Big green lizard	LC
<i>Ophisops elegans</i> (Berthold 1842) = Field Lizard	LC
<i>Typhlops vermicularis</i> (Daudin 1803) = Blind snake	LC
<i>Coluber caspius</i> (Gmelin 1789) = Hazer snake	LC
<i>Eirenis modestus</i> (Martin 1838) = Tame snake	LC
<i>Vipera xanthina</i> (Gray 1849) = Banded viper	LC
<i>Dolichophis jugularis</i> (Linnaeus, 1758) = Mountain black snake	LC

(Aves)

<i>Aegolius funereus</i> (Linnaeus, 1758) = Long Tron Owl	LC
<i>Buteo buteo</i> (Linnaeus, 1758) = Bee Falcon	LC
<i>Carduelis carduelis</i> (Linnaeus, 1758) = Goldfinch	LC
<i>Columba palumbus</i> (Linnaeus, 1758) = Wood pigeon	LC
<i>Corvus corax</i> (Linnaeus, 1758) = Big Crow, Raven	LC

<i>Falco tinnunculus</i> (Linnaeus, 1758) = Kestrel	LC
<i>Garrulus glandarius</i> (Linnaeus, 1758) = Gray jay	
<i>Hirundo rustica</i> (Linnaeus, 1758) = Swallow	LC
<i>Merops apiaster</i> (Linnaeus, 1758) = Bee-eater	LC
<i>Pica pica</i> (Linnaeus, 1758) = Magpie	LC
<i>Passer domesticus</i> (Linnaeus, 1758) = Common sparrow	LC
<i>Streptopelia decaocta</i> (Frisvaldszky, 1838) = Dove	

(Mammalia)

<i>Sciurus vulgaris</i> (Linnaeus, 1758) = Squirrel	LC
<i>Erinaceus europaeus</i> (Linnaeus, 1758) = Hedgehog	LC
<i>Hystrix cristata</i> (Linnaeus, 1758) = Porcupine	LC
<i>Martes foina</i> (Erxleben, 1777) = Beech marten	LC
<i>Meles meles</i> (Linnaeus, 1758) = Badger	LC
<i>Mustela nivalis</i> (Linnaeus, 1766) = Poppy	LC
<i>Sus scrofa</i> (Linnaeus, 1758) = Wild Pig	LC

Threats and Recommendations

Important factors threatening biodiversity are ranked as:

a) Corruption of natural areas and transformation to agricultural areas b) Destruction of forests
c) Climate change d) Excessive consumption of natural resources e) transfuse the invasive species to some areas. The effects of these factors change depending on the geographical positions of the countries. Secondary reasons for biodiversity loss are stated as; excessive human population growth, excessive consumption, excessive waste, urbanization, and international conflicts.

Global threats given above will also affect biological diversity in Muğla Sıtkı Koçman University main campus. This campus is ultimately a part of the world. However, it is hard to reveal the effects of the factors as mentioned earlier, on biological diversity or effect level. With some sustainable observations and research, the factors that threaten campus biodiversity should be searched and audited. Specific to the University Campus, the factors that the rate the campus biodiversity and precautions that should be taken are given below.

- 1- Muğla Sıtkı Koçman University Campus is a place to be considered as small regarding the field size. Pine trees in some areas have been protected since their establishment. These areas need to be saved without being tightened due to primarily construction and other reasons. Some trees and ornamental plants do not belong to the natural flora have been planted close to the buildings and wayside. These have not been thought to have an essential effect on campus biological diversity. However, planting this type of trees and ornamental plants not existing in the natural flora in protected areas in the campus should be searched, and only the appropriate species and not harmful to the natural flora should be planted. In addition, while choosing the species to plant, global problems such as warming and drought should be considered, and preventive species or stable ones for these problems should be chosen.
- 2- The bushes and plants under the pine grow on the campus are cleaned by being cut from time to time. These areas are natural shelter and breeding sites for insects, some amphibians, and small mammals. While this type of activity affects flora and fauna, it is needed to get support from expert lecturers.
- 3- . Additional birdboxes to the existing ones on trees should be built for the birds living on the campus.
- 4- The population of 22 fungus species growing on the campus has been decreased due to the excessive gathering. Moreover, poisonous species are gathered together with nontoxic ones. Therefore, picking mushrooms in the campus should be done with accompany of the experts and warning meetings and seminars should be arranged especially on poisonous fungus.
- 5- Construction in the campus area is an inevitable truth. However, the biological diversity of the areas planned to build should be searched, and the harm's size should be detected. Therefore, habitat fragmentation should be prevented.
- 6- Domestic animals wandering around the campus, especially the frogs, are a vital threat to reptiles, birds, and mammals. Domestic animals such as cats and dogs come closer to the wildlife subjects living in their natural environment. Furthermore, diseases in pets may spread rapidly on wild species that do not have immunity to these diseases. Accordingly, it is risky for the biological diversity that pets wander around the campus. In addition, wild animals' taking the food left for these animals may destroy their bowel flora and cause diseases. That's why the pets wandering around the campus should be sheltered.

- 7- Constructions to build such as buildings, classrooms, pools, water collecting, recreation, and sports areas threat the habitat of endemics of the campus. At this point, these areas should be determined through the opinions of the experts.
- 8- One of the most essential threats towards Campus biodiversity is the lack of biodiversity awareness.
- 9- Therefore, meetings and seminars should be arranged, and biological diversity should be improved using signs and visuals such as photos in certain campus places.

Objectives

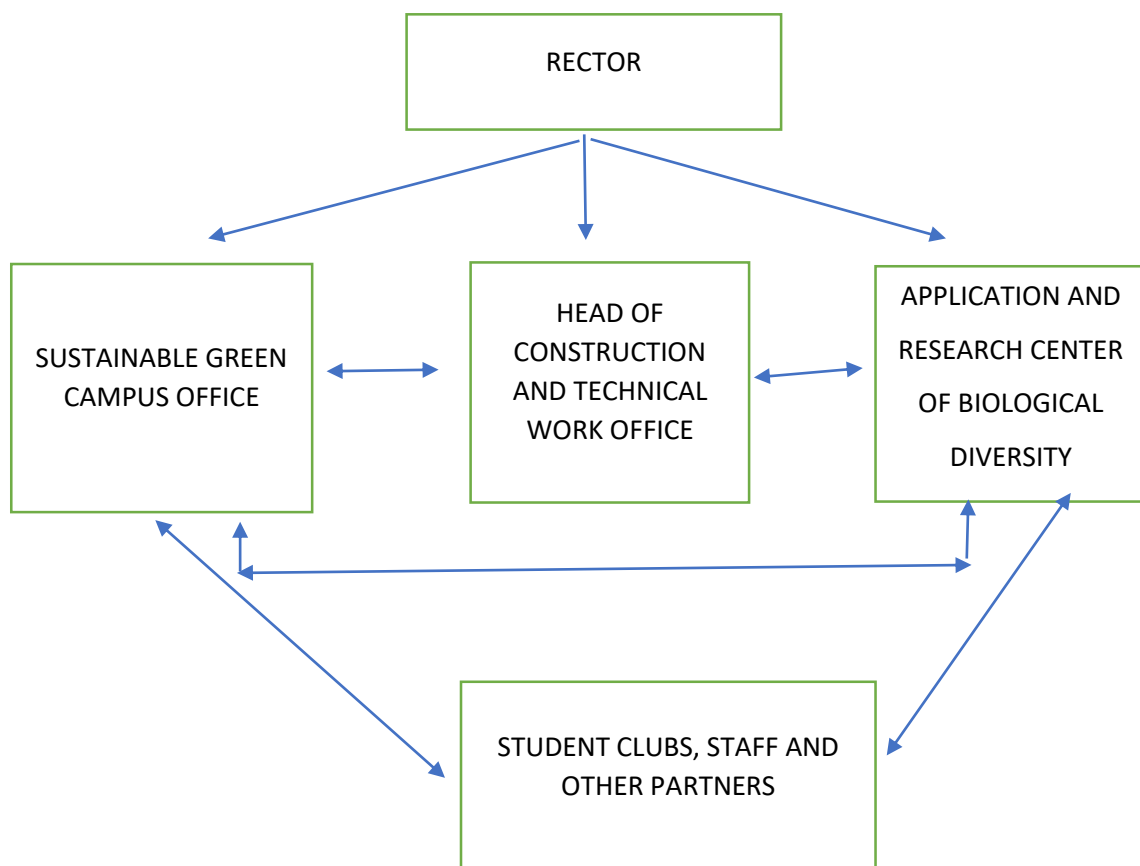
Short and medium-term objectives

- 1- Research for Campus biodiversity
- 2- Detection of endemic and endangered species
- 3- Introduction of Campus in terms of Biological Diversity
- 4- Setting common goals with all partners within Protection Action Plan
- 5- Sheltering the pets in campus
- 6- Organization of Education and Briefing Seminars

Long term objectives

- 1- Providing the sustainability of research on biological diversity of campus
- 2- Arrangement of ecology-based activities in campus
- 3- Providing all staff to be biological diversity

Biological Diversity Protection Action Plan Management Model



The coordination of this Action Plan is under the responsibility of honoured Prof. Dr. Hüseyin ÇİCEK, the Rector of Muğla Sıtkı Koçman University and University Rectorate.

Muğla Sıtkı Koçman University Campus Biological Diversity Protection Action Plan aims to reach the objectives given below:

Sustainable Green Campus Office, Head of Construction and Technical Work Office, and Biological Diversity Application and Research Center will act throughout the demands of the Rector and be in cooperation and contact. Therefore, possible effects of new construction on Biological Diversity are avoided. Other partners and staff will be informed. As a whole, all administrative mechanisms and staff will be informed on Biological Diversity literacy.

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