ESM 1. Birds related to arboreal environments in Sicily; their habitats, chorology and evaluation on their role as indicators (the trend is evaluated with reference to Sicily's atlases: Massa 1985, Lo Valvo *et al*. 1993, AA.VV. 2008).

Species	**Habitat**	**Could it be considered as a good health and quality indicator for Sicily's woods?**
Eurasian Sparrowhawk *Accipiter nisus* (L.)	It breeds in mixed forests; in recent years it has also been expanding in reforestations.	The trend to which it is subject (expansion also in reforestations) makes it a good indicator but it is still distributed in a fragmentary manner.
Common Buzzard *Buteo buteo* (L.)	In Sicily, unlike what happens in other areas, it also nests on rocky cliffs or trees if necessary. Their privileged habitat during nesting is that of the mosaic, having rocks or isolated trees, combined.	It avoids dense forests regardless of their specific composition; it is therefore not a good indicator.
Eurasean Hobby *Falco subbuteo* L.	In Sicily, it could be defined as a "cloak" species; it nests in the woods but at the edge of open habitats (especially grazing lands).	The extreme localization, does not allow to make any assessments, however, it seems to be related to sparse tree environments. It has also nested in eucalyptus trees.
Common Wood Pigeon *Columba palumbus* L.	Once linked to the woods, it is today booming in all areas having trees as a component.	Until a few years ago it could have been considered as a good indicator, but it is not one anymore.
European Turtle Dove *Streptopelia turtur* (L.)	It is linked to the dry arboreal formations and forests up to 1100 m altitude.	It lives either in dry arboretums (almond groves, olive groves, etc..) and in the scrub-forests. It does not generally nest in pine and eucalyptus tree reforestations. Appears to be in recovery.
Common Cuckoo *Cuculus canorus* L.	It is widespread in the vegetation and forest mosaics. It is a parasite species that lays its eggs in other birds nests, mostly in shrubby areas or scrubland.	For this species, their density could be used as an indicator but it actually appears to be dependent on food resources (caterpillars).
Barn Owl *Tyto alba* (*Scopoli*)	With regards to forests, it could be considered as a "cloak" species.	It cannot be considered as an indicator for woods.
European Scops Owl *Otus scops* (L.)	A widespread species; it always lives at the edge of woods, however, it reaches its altitudinal limit at the reach of Mount Etna in the forests of *Pinus nigra*.	It can not be considered as an indicator for woods.
Tawny Owl *Strix aluco* L.	The species is also found in open habitats as long as there are rocks for nesting. Also in the woods, the presence of rocks or hollow trees, is fundamental.	If present in the woods with no rocks, its ability to nest is mainly due to hollow trees that can accommodate the nests; However it is not considered a good indicator because it also nests in rocky areas that lack tree covering.
Long-Eared Owl *Asio otus* (L.)	A species that has colonizing Sicily for a few years and that seems to be expanding its niche; It is nontheless linked to forest environments.	Although it is found in small size reforestations, which it uses as winter recovery, is in great expansion in the forest areas.
European Nightjar *Caprimulgus europaeus* (L.)	It appears to be linked to sparse forests and open mountainous areas.	It is not widespread and its ecology is little known in Sicily. It can not be considered as an indicator.
Hoopoe *Upupa epops* (L.)	It can not be defined as a forest species for it lives in different tree environments.	It can not be considered as an indicator for those woods which it sporadically lives in.
Eurasian Wryneck *Jynx torquilla* (L.)	It nests in natural mixed forests.	The localized distribution does not appear to be easily correlated to environmental parameters.
Great Spotted Woodpecker *Dendrocopos major* (L.)	As for the common pigeon, it has expanded its niche and now also lives in mature reforestations.	It may be considered as an indicator of "naturalness" achieved by afforestation. The different densities make it a good indicator, in general.
Woodlark *Lullula arborea* (L.)	Mosaic and edge species.	It lives on the edge of woods and reforested areas, it is not a good forest indicator.
Eurasian Wren *Troglodytes troglodytes* (L.)	Woodland and scrub species that has broadened its niche in recent years (orchards, etc.).	Perhaps density, for this species, may be used as an indicator, but the species is distributed in many different habitats, even suburban ones.

continued

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European Robin *Erithacus rubecula* (L.)	It nests in natural forests but it seems to be expanding.	As a breeder, and certainly not as a wintering, it appears to be a good indicator, which is in expansion in non-forest areas.
Common Blackbird *Turdus merula* (L.)	It is a well-spread species in many different environments that can also include a low vegetation cover.	It is a very common species and it is not considered a good indicator since it prefers marginal areas.
Mistle Thrush *Turdus viscivorus* (L.)	It breeds in mixed woods such as: holm oaks and downy oaks.	It is expanding into areas such as the Sicani mounts, where pine reforestations are in the process of naturalization carried out by broadleaf trees.
Eurasian Blackcap *Sylvia atricapilla* L.	It is widespread in tree covered areas, but also in orchards and scrubs.	Is not considered as a good indicator, since it is easily found even in urban greeneries and orchards.
Common Chiffchaff *Phylloscopus collybita* (Vieillot)	As a breeder it is linked to natural deciduous and conifer forests or reforestation areas in which conifers have been planted for at least 40 years.	It may be considered as an indicator for mesophilic forests diversity.
The Common Firecrest *Regulus ignicapillus* (Temminck)	It nests in deciduous oak and beech forests having Ilex aquifolium, and sometimes in conifers too. It also nests along the coastal areas in specific conditions.	It lives in high humidity conditions, even at low altitudes when facing north and it probably is not a good indicator.
Spotted Flycatcher *Muscicapa striata* (Pallas)	It usually lives in wooded areas but it also appears in sparse forests and reforestation areas.	It can not be considered as an indicator.
Long-tailed Tit *Aegithalos caudatus siculus* (Whitaker)	It lives in broadleaf forests.	Perhaps it may be considered more properly as an indicator of humidity conditions within the forest.
Marsh Tit *Poecile palustris siculus* (De Burg)	It is related to beech forests having a stratified vegetation by the presence of undergrowth in Ilex aquifolium, Prunus spinosa, Crataegus oxycantha.	It is considered as a good indicator for mountain forests; the subspecies that lives in Sicily is endemic. Nontheless the vegetation structure of forests in Sicily, should be studied in more depth.
Coal Tit *Periparus ater* (L.)	It lives in natural mesophilic and mountain forests. It has recently colonized conifer reforestations planted for over 40 years.	It may be considered as a good indicator. Species such as the following can also use cavities in the stone walls for nesting, but often it nests at the base of trees, inside holes among the roots. The species is increasing its number.
Eurasian Blue Tit *Cyanistes caeruleus* (L.)	It lives in many different arboreal formations but mostly in forests.	Its density may be considered a good parameter that indicates the quality of the woods, but this depends on its diet and it is very ubiquitous for it is found also in olive groves.
African Blue Tit *Cyanistes teneriffae ultramarinus* (Lesson)	It lives in trees and tree-shrub formations on the island of Pantelleria, the only place in Europe where this species is present.	Even for this species density could be a good indicator but il can also be observed outside woods and it lives exclusively in Pantelleria.
Great Tit *Parus major* L.	It is more widespread compared to the previous species.	It cannot be considered as a good indicator due to its ubiquity.
Eurasian Nuthatch *Sitta europaea* L.	It lives in natural forests, in a range of 700 and 1.70 mt of height. It can be found especially in the areas from Mandonia to Etna	It can be considered as a good indicator in that ripe forests area.
Short-toed Treecreeper *Certhia brachydactyla* C. L. Brehm	It lives in tree-lined areas, and besides natural and artificial forests it can also be found in dry arboretums as well.	Its diffusion could be considered as a good indicator but it can be easily found in green urban environments. It is an indicator of plants size.
Eurasian Golden Oriole *Oriolus oriolus* (L.)	In Sicily it has an irregular distribution as a breeding bird.	It cannot be considered as an indicator because of its irregular distribution.
Red-Backed Shrike *Lanius collurio* L.	It lives in clearings and high Mountain forests.	It is a landscape indicator. It highlights the balance between open and closed spaces.

continued

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Woodchat Shrike *Lanius senator* L.	It is a mosaic species. It lives in new reforested areas as well.	It cannot be considered a forestry indicator.
Eurasian Jay *Garrulus glandarius* (L.)	It lives in tree-lined areas.	Its density could be used as an indicator, but the species is spreading in orchards as well.
Eurasian Magpie *Pica pica* (L.)	It lives in tree-lined areas	It does not live in forests.
Common Chaffinch *Fringilla coelebs* L.	Although it appears in tree-lined areas, this species is not very common as a breeding bird. During the winter Center-Europe populations use Sicilian forests as dormitories.	After its decrease, today its presence could be used as an indicator of forest quality.
European Serin *Serinus serinus* (L.)	It appears in tree-lined areas.	It cannot be considered as a good indicator because it lives in conifer reforested areas, cultivated gardens and green urban areas.
European Greenfinch *Carduelis chloris* (L.)	Although it appears in tree-lined areas, it is not as common as breeding bird.	It is not a good indicator because it lives in conifer reforested areas.
European Goldfinch *Carduelis carduelis* (L.)	Although it lives in tree-lined areas, it leaves those that are too dense.	It cannot be considered as a good indicator.
Eurasian Siskin *Carduelis spinus* (L.)	It appears in Etna natural black pine forests as a breeding bird.	It confirms the extraordinary value of natural black pine forests, as other species do, but it cannot be used as an indicator.
Common Linnet *Carduelis cannabina* (L.)	It lives in non-too-dense tree-lined areas, as does the European Goldfinch.	It is not a good indicator.
Red Crossbill *Loxia curvirostra* L.	It is originally linked to Etna natural black pine forest (Priolo & Sarà 1981), it sometimes appears in Aleppo pine reforested areas of the Island (Baglieri and Iapichino, 1990) where its population is stable (AA. VV. 2008). This species make periodic invasions (Sturniolo 1910, Whitaker 1910).	It can be considered as an indicator of the ripeness of gymnosperm reforested areas. In the Etna area there is a stable population of this species, which underlines the balance of conifer forest.

ESM 2. Land use (ha) variations (%) (years 1987-2000) in the 31 quadrants in which the Mistle Thrush appeared.

Land use classes	**1987**	**2000**	**Variations**
Arable	52,491	43,470	–17.2
Grazing	66,659	46,906	–29.6
Complex System	31,443	26,825	–14.7
Almond grove	6,829		–100.0
Olive grove	27,779	30,575	10.1
Vineyard	2,293	724	–68.4
Orchard	27,741	27,637	–0.4
Broadleaves	19,096	37,250	99.5
Eucalyptus broadleaves	222	1,075	384.2
Ripe conifers	1,340	1,157	–13.6
Reforestation conifers	298	1,437	382.2
Mixed forests	5,585	7,420	32.9
Partially wooded areas	25,368	20,201	–20.4
Bush and scrubland	20,607	41,323	100.5
Sparse vegetation	4,316	1,800	–58.3
Urban environments and infrastructures	5,657	4,093	–27.6
Beaches	14	99	587.0
Watercourses	1,150	1,466	27.4
Water basins	181	102	–43.7
Total	**299,071**	**293,559**	

ESM 3. Land use (ha) variations (%) (years 1987-2000) in the 23 quadrants in which the Long-eared Owl appeared.

Land use classes	**1987**	**2000**	**Variations**
Arable	58,293.7	52,224.6	–10.4
Grazing	48,621.6	28,841.4	–40.7
Complex System	22,040.8	21,890.7	–0.7
Almond grove	283.0		–100.0
Olive grove	9,910.9	7,748.7	–21.8
Vineyard	3,195.2	3,022.6	–5.4
Orchard	11,455.5	11,483.2	0.2
Broadleaves	16,396.7	25,056.3	52.8
Eucalyptus broadleaves	3,270.0	4,054.0	24.0
Ripe conifers	1,587.5	852.9	–46.3
Reforestation conifers	471.0	1,281.0	172.0
Mixed forests	2,459.8	3,845.2	56.3
Partially wooded areas	20,093.4	14,784.8	–26.4
Bush and scrubland	7,712.5	32,362.7	319.6
Sparse vegetation	7,388.5	4,572.2	–38.1
Urban environments and infrastructures	8,774.0	9,555.3	8.9
Watercourses	673.7	691.3	2.6
Water basins	74.9	92.2	23.1
Total	**222,702.7**	**222,359.0**	

ESM 4. Land use (ha) variations (%) (years 1987-2000) in the 17 quadrants in which the Eurasian Nuthatch appeared.

Land use classes	**1987**	**2000**	**Variations**
Arable	13,951	8,431	–40
Grazing	47,676	24,000	–50
Complex systems	12,819	14,501	13
Olive groves	13,661	9,999	–27
Vineyard	294	117	–60
Orchard	15,433	16,229	5
Broadleaves	12,691	26,055	105
Eucalyptus broadleaves	5	264	5517
Conifers	1,422	609	–57
Reforestation conifers	600	868	45
Mixed forest	7,291	8,344	14
Partially wooded areas	20,483	16,727	–18
Bush and scrublands	10,158	29,610	191
Sparse vegetation	3,482	928	–73
Urban environment and infrastructures	5,750	7,991	39
Watercourses	808	1,197	48
Water basins	153	108	–29
Total	**166,678**	**165,978**	

ESM 5. Land use (ha) variations (%) (years 1987-2000) in the 5 quadrants in which the Sicilian Marsh Tit appeared.

Different land use	**1987**	**2000**	**Variations**
Arable	3,948	2,364	–40
Grazing	17,195	9,000	–48
Complex Systems	411	2,240	444
Olive grove	3,472	3,524	2
Vineyard	0	55	
Orchard	2,353	2,255	–4
Broadleaves	8,935	15,008	68
Eucalyptus grove	0	0	
Conifers	18	19	7
Conifers reforestation	4	11	157
Mixed forest	440	1,640	273
Partially wooded areas	13,294	5,987	–55
Bush and scrublands	184	7,972	4223
Sparse vegetation	667	596	–11
Urban enviroments and infrastructures	279	437	57
Watercourses	73	180	148
Water basins	40	26	–35
Total	**51,314**	**51,314**	

ESM 6. Land use (ha) variations (%) (years 1987-2000) in the 86 quadrants in which the Greater Short-toed Lark disappeared.

Different land use	**1987**	**2000**	**Variations**
Arable	292,514.4	294,122.7	0.5
Grazing	68,410.0	71,196.3	4.1
Complex systems	140,813.2	72,220.8	–48.7
Almond grove	14,725.5		–100.0
Olive grove	57,942.5	70,911.2	22.4
Vineyard	60,573.2	70,481.4	16.4
Orchard	44,659.6	54,015.1	20.9
Broadleaf	15,572.0	17,598.8	13.0
Conifers	7,808.2	10,890.0	39.5
Mixed forest	2,142.3	5,456.1	154.7
Partially wooded areas	8,890.8	6,129.5	–31.1
Bush and scrubland	33,014.7	66,149.9	100.4
Sparse vegetation	7,069.2	9,505.7	34.5
Urban environments and infrastructures	24,895.6	30,483.7	22.4
Green urban areas	196.0	353.4	80.3
Watercourses	527.4	210.5	–60.1
Water basins	2,044.8	2,349.8	14.9
Marshes	286.0	309.1	8.1
Total	**782,085.4**	**782,383.7**	

ESM 7. Land use (ha) variations (%) (years 1987-2000) in the 75 quadrants in which the Calandra Lark disappeared.

Different land use	1987	2000	Variations
Arable	250,573.3	275,087.6	9.8
Grazing	53,708.0	51,072.1	–4.9
Complex systems	144,701.8	71,119.7	–50.9
Almond grove	15,224.0		–100.0
Olive grove	43,229.2	57,997.1	34.2
Vineyard	69,156.5	73,521.3	6.3
Orchard	18,724.3	26,098.1	39.4
Broadleaves	14,086.3	20,498.3	45.5
Conifers	3,754.6	6,045.8	61.0
Mixed forest	2,230.5	4,955.4	122.2
Partially wooded areas	11,340.6	5,860.3	–48.3
Bushes and scrublands	25,746.8	54,504.6	111.7
Sparse vegetation	6,709.7	9,233.2	37.6
Urban environments and infrastructures	19,617.1	24,101.9	22.9
Green urban areas	146.0	290.6	99.1
Beaches	1,623.8	993.6	–38.8
Watercourses	1,026.2	987.3	–3.8
Water basins	1,183.6	1,379.7	16.6
Marshes	618.4	361.7	–41.5
Total	**683,400.6**	**684,108.3**	