

EFFECTS OF FOREST EXPLOITATION ON  
THE BEECHWOOD BIRDS OF  
THE SOUTHERN APENNINES

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The forest exploitation causes great changes in vegetal physiognomy with consequent modifications of bird communities (for a complete discussion see Ferry & Frochot 1974 and Adams & Barrett 1975). In order to investigate this phenomenon, we undertook a comparative census of birds breeding in a semi-natural and in an exploited beech wood.

Study area and methods

The study areas are located in the beech-woods of Fondillo and Pesco di Iorio valley in the Abruzzi National Park (Southern Apennines). The beechwood of Fondillo valley is made by trees of the same age (less than 50 years) without undergrowth. The trees have straight trunks, with few holes. The beech-wood of Pesco di Iorio valley is composed by old, semi-natural trees of different ages with abundant holes. Bare patches are present and many dead trees lie on the ground. Here and there undergrowth is present. The study areas's height ranges from 1100 to 1600 meters above sea level. The bird census was done by the frequential sampling method (E.F.P.) as described by Blondel (1975). The listening stations, 27 in Pesco di Iorio and 19 in Fondillo valley, were chosen at random. The census work lasted from the 15th June '78 to the 30th June '78.

Species diversity was calculated according to Shannon-Wiener function  $H' = -\sum p_i \log p_i$ , in which  $p_i$  is proportion of individuals in the  $i$ th species (Shannon & Weaver 1964). The equitability was calculated by the formula  $H'/H'_{\max}$  (Pielou 1963). For comparing the diversity of the two study areas we employed the Hutcheson test (Hutcheson 1970). The quantity of individuals belonging to each species, was expressed by the centesimal frequency  $FC = FA_i/N$  where  $FA_i$  is the number of occurrences of  $i$ th species in the  $N$  censuses of the sample.

## Results and discussion

The species breeding in the two beech-woods are shown in Tab. I, and the bird community's structure is summarized in Tab. II.

TABLE I . The birds breeding in the two study areas and their FCI

	Pesco di Iorio Valley	Fondillo Valley
<i>Buteo buteo</i>	7	-
<i>Columba palumbus</i>	4	-
<i>Streptopelia turtur</i>	15	-
<i>Cuculus canorus</i>	81	21
<i>Upupa epops</i>	15	-
<i>Picus viridis</i>	15	5
<i>Denârocopos leucotos</i>	7	-
<i>Garrulus glandarius</i>	7	-
<i>Troglodytes troglodytes</i>	63	42
<i>Ficedula albicollis</i>	30	-
<i>Sylvia atricapilla</i>	48	16
<i>Phylloscopus collybita</i>	70	52
<i>Phylloscopus bonelli</i>	26	10
<i>Phylloscopus sibilatrix</i>	18	5
<i>Regulus ignicapillus</i>	30	5
<i>Phoenicurus phoenicurus</i>	11	-
<i>Erithacus rubecula</i>	33	58
<i>Turdus merula</i>	52	5
<i>Turdus philomelos</i>	26	-
<i>Turdus viscivorus</i>	59	10
<i>Parus ater</i>	44	52
<i>Parus caeruleus</i>	48	26
<i>Parus major</i>	44	10
<i>Sitta europaea</i>	33	26
<i>Certhia familiaris</i>	44	26
<i>Fringilla coelebs</i>	100	74
<i>Pyrrhula pyrrhula</i>	37	50

The beech-wood of Pesco di Iorio Valley supports a higher number of species than the other. The two community have 19 species in common (66% of total); moreover the species present in Pesco di Iorio Valley have a frequency FC higher than the species of Fondillo Valley with the exception of three species: Coal tit, Bullfinch and Robin. The Pesco di Iorio beech-wood, close to climax, has a greater number of hole nesting species as: Redstart, Collared Flycatcher, White-backed Woodpecker, Green Woodpecker, Hoopoe, ecc.

There is a significant difference between the two diversities  $H'$  ( $P < 0,001$ ). The Pesco di Iorio  $J'$  value is nearer to 1 and according to several authors (MacArthur & MacArthur 1961, Ferry & Frochet 1970, Blondel *et al.* 1973) this corroborates that the more heterogeneous and complex is a habitat, the more species are equally distributed.

The forest exploitation in Fondillo Valley caused a change and a reduction in the number of bird species. In fact this man-made habitat (composed by trees of the same age) can support above all ubiquitous species, as a rule less exigent in the choice of the foraging and reproductive niches.

TABLE II. The structure of bird communities in the two study area

	Pesco di Iorio	Fondillo
N (sample)	27	19
S (richness)	27 (14 families)	18 (9 families)
s (mean richness)	$9.8 \pm 2$	$5 \pm 2$
$H'$ (Shannon diversity)	3.15	2.62
$J'$ (equitability)	0.95	0.89

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## RIASSUNTO

Effetti dello sfruttamento forestale sugli uccelli nidificanti in due faggete dell'Appennino meridionale.

Il censimento degli uccelli nidificanti mediante E.F.P. (Echantillonnage fréquentiel progressif) in due faggete dell'Appennino meridionale ha evidenziato gli effetti dello sfruttamento forestale sulla diversità ( $H'$ ) del popolamento ornitico.

Il censimento fu condotto in una faggeta allo stato seminaturale (Valle di Pesco di Iorio, Pescasseroli AQ) ed in una soggetta a periodici tagli (Val Fondillo, Pescasseroli AQ). La prima, con alberi molto vecchi e di differenti età, presentava ampie radure con numerosi faggi a terra in fase di marcescenza. Erano presenti numerose cavità naturali sulle piante, e un sottobosco. La seconda faggeta era caratterizzata da alberi coevi, in formazione compatta, poveri di cavità naturali, con suolo privo di sottobosco.

Nella faggeta allo stato seminaturale le specie nidificanti trovate sono 27 (contro le 18 della faggeta soggetta a tagli periodici), e l'indice di diversità  $H'$  della comunità ornitica è significativamente maggiore (3.15 contro 2.62,  $P < 0.001$ ).

La  $J'$  (equiripartizione) delle specie presenta valori più vicini all'unità nella faggeta seminaturale.

Questi risultati sono in accordo con quanto sottolineato da diversi autori: maggiore è la complessità degli ambienti e maggiore è il numero di nicchie (alimentari e riproduttive) che possono essere occupate da specie differenti di uccelli.

In conclusione lo sfruttamento di queste foreste porta ad un impoverimento delle specie ornitiche più esigenti in fatto di habitat, come gli uccelli che nidificano in cavità arboree e ricercano il cibo lungo i tronchi degli alberi.

## RESUME

Effets de l'exploitation forestière sur les oiseaux de deux hêtraies dans les Apennins meridionaux

Le recensement, effectué par la méthode de l'échantillonnage fréquentiel progressif, des oiseaux nichant dans deux hêtraies dans les Apennins meridionaux a mis en évidence les effets de l'exploitation forestière sur la diversité des oiseaux nicheurs.

Le recensement fut effectué dans une hêtraie dans des conditions seminaturelles (Valle di Pesco di Iorio, Pescasseroli AQ) et dans une hêtraie qui est

soumise à des coupures périodiques (Val Fondillo, Pescasseroli AQ). La première hêtraie présente des arbres très vieux, avec des nombreuses clarières, beau - coup de troncs abattus, et un sous-bois. Les arbres présentent de nombreuses cavités naturelles. La seconde hêtraie est caractérisée par des arbres du même âge, pauvres de cavités naturelles et sans sous-bois qui est interdit par une dense couverture arborescente.

Dans l'hêtraie semi-naturelle les espèces d'oiseaux nicheurs furent 27 (18 espèces dans l'hêtraie exploitée périodiquement). L'indice de la diversité  $H'$  est significativement plus grand que pour la hêtraie seminatareille (3.15) que celui de la hêtraie exploitée (2.62,  $P < 0.001$ ).

La  $J'$  (Equiripartition) a des valeurs plus près de l'unité dans la hêtraie seminatareille (0.95 et 0.89 respectivement).

Ces résultats sont d'accord avec ce qui a été souligné par plusieurs auteurs: plus grande est la complexité des milieux et plus nombreuses sont les niches (alimentaires et reproductives) qui peuvent être occupées par des différentes espèces d'oiseaux.

En conclusion l'exploitation des bois provoque une diminution des espèces les plus exigeantes dans le choix de l'habitat, par exemple les oiseaux nichant dans les trous des arbres et qui recherchent la nourriture sur les troncs.

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