

Habitat recovery after invasive plant removal: the case of *Carpobrotus* eradication from the Pontine islands (Lazio, central Italy)

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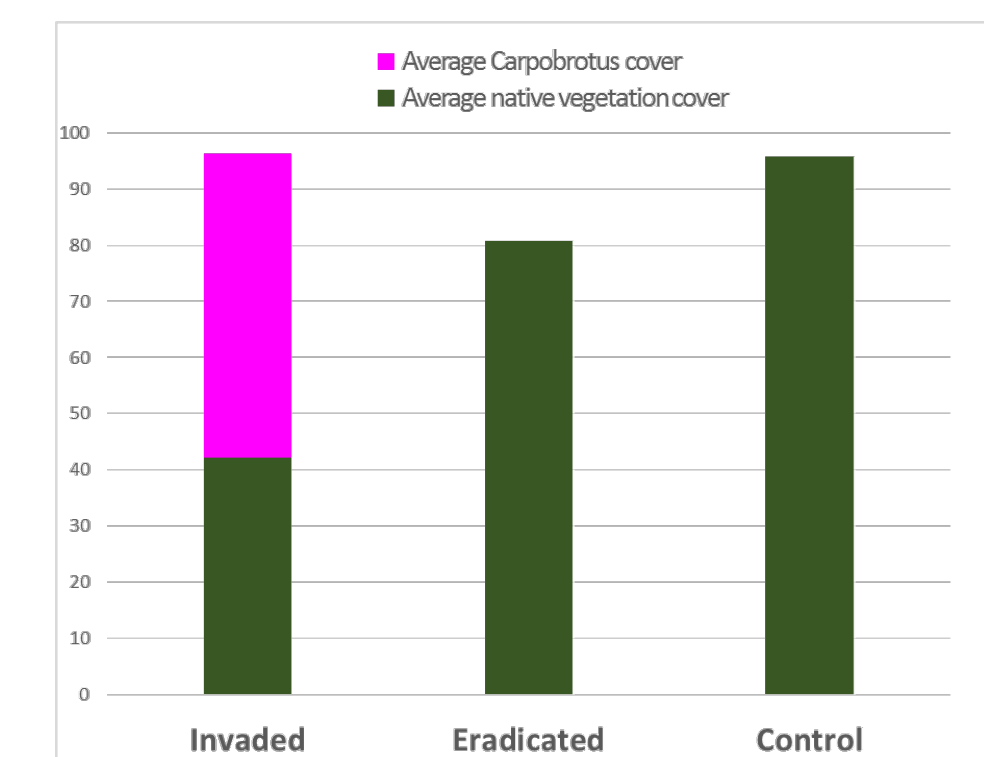
The multi-taxon project LIFE NAT/IT/000544 aims at restoring the natural ecosystems of the Pontine islands (Central Italy) through a set of conservation actions that include the eradication of black rats (*Rattus rattus*), feral goats (*Capra hircus*), and invasive plants of the genus *Carpobrotus*. Here, we present some results of the monitoring activities following manual eradication of *Carpobrotus* in 2017.

In the Pontine Archipelago *Carpobrotus* often spreads on the rocky coasts, threatening habitats of Community interest (1240, 5320, 5330), and rare and/or endemic plants (*Limonium pontium*, *L. pandatariae* and *Matthiola tricuspidata*).

As *Carpobrotus* generally grows intermingled with native plant species, we chose manual eradication to minimise damage to habitats and species of conservation interest. So far, *Carpobrotus* has been removed by project participants from all accessible public areas, for a total of about 1100 m². Stands on sheer cliffs and slopes with safety risks will be manually removed by specialized personnel with specific equipment.

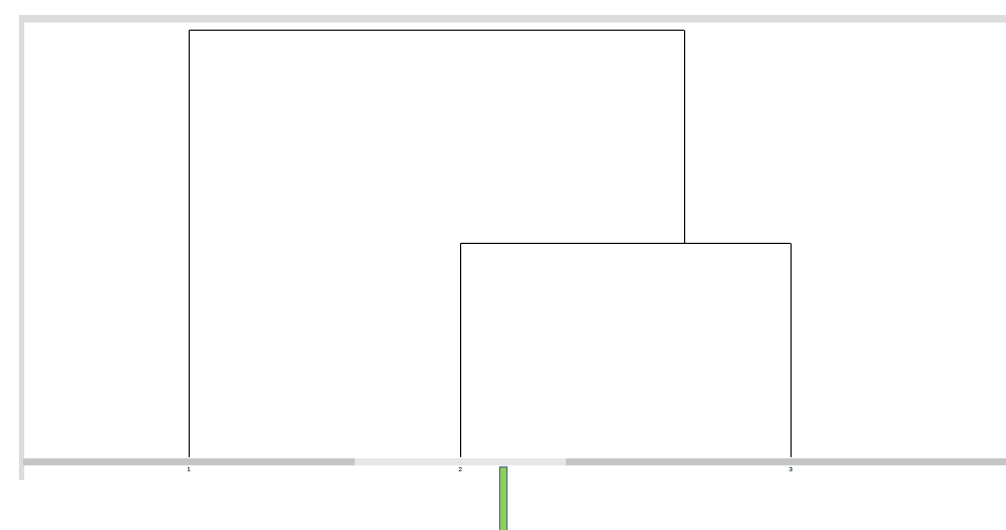
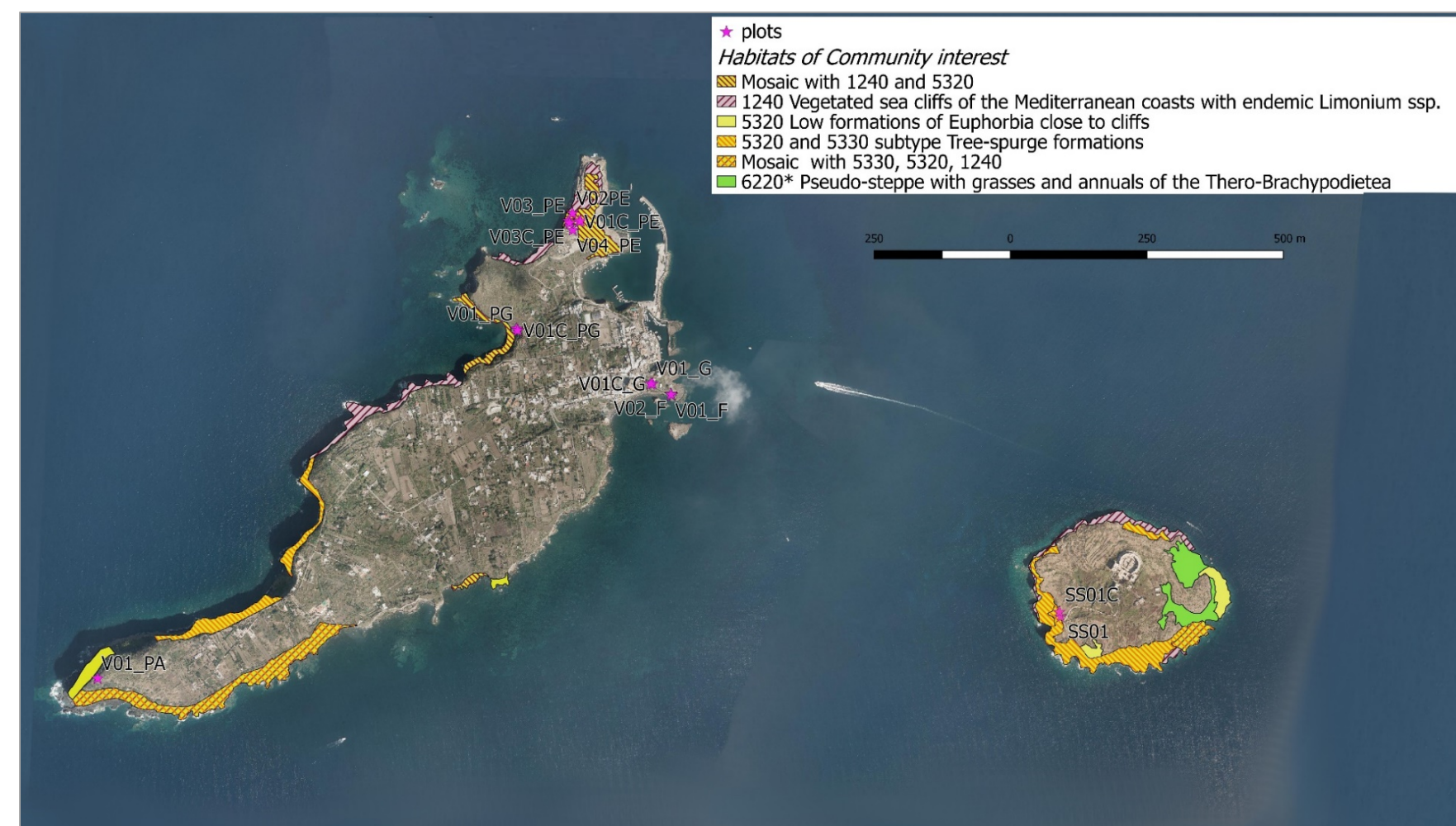
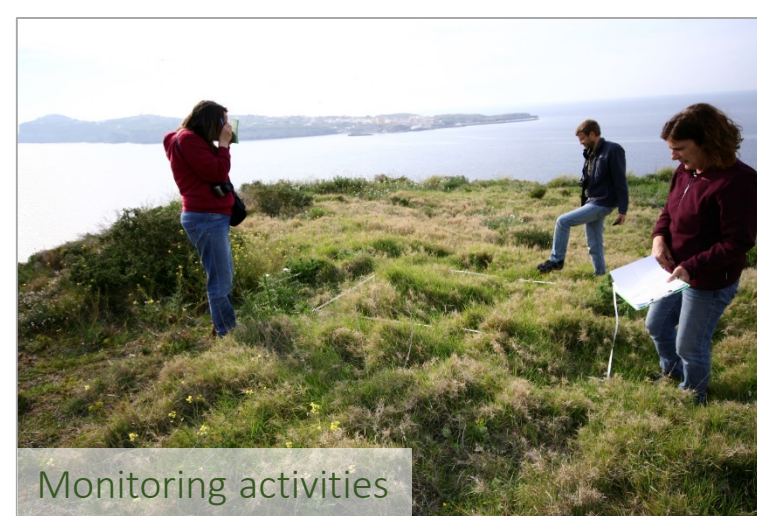
Since 2017, we have been surveying yearly (in April) 10 permanent plots with *Carpobrotus* plus 5 control plots (similar vegetation in analogous environmental conditions) on Ventotene e Santo Stefano.

Plot size is 2x2m, based on the area of the smallest stand. We recorded physical features (slope, aspect, landform), number of flowers and buds of *Carpobrotus* (when initially present), and the relative percent cover of each species.

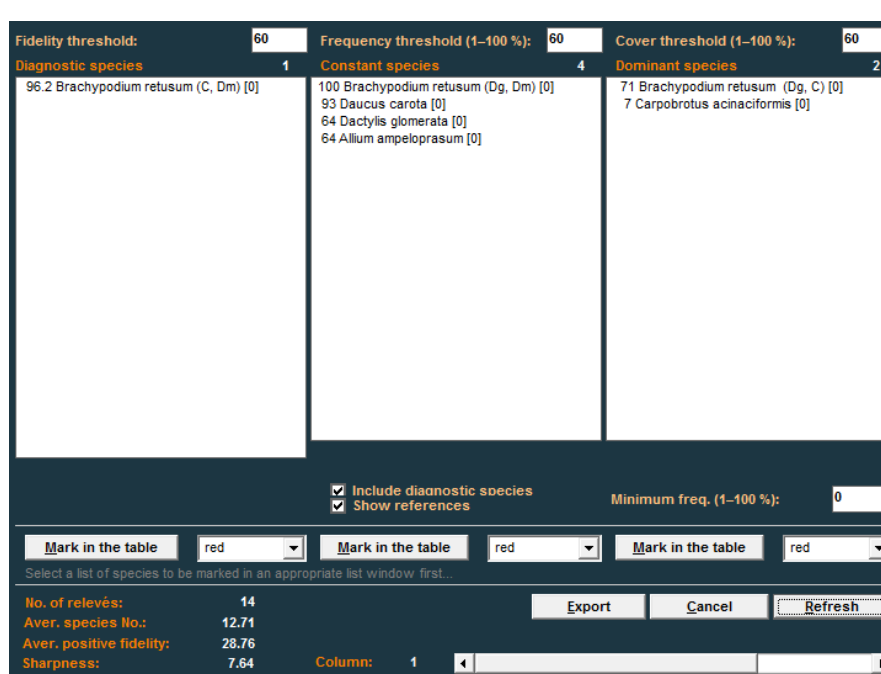


In eradicated areas we see a strong increase in natural vegetation cover. The higher total cover of control areas suggests a further increase in native vegetation cover in the next years. Differences in average cover highlight which species (in **bold**) benefited from *Carpobrotus* removal, * indicates endemic and rare species.

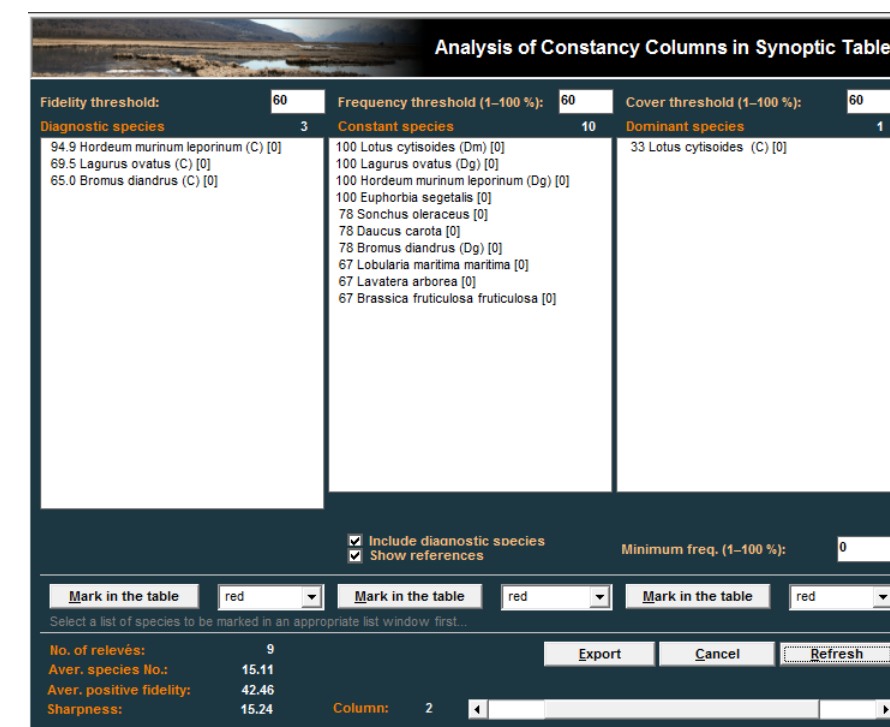
Species	Fr	Av_Cov control	Av_Cov invaded	Av_cover eradicated
<i>Carpobrotus acinaciformis</i>	10	0.0	59.5	0.0
<i>Lotus cytisioides</i>	36	20.4	8.9	27.9
<i>Daucus carota</i>	39	13.6	4.3	17.4
<i>Brachypodium retusum</i>	15	42.2	16.5	10.1
<i>Euphorbia segetalis</i>	29	5.2	2.8	5.6
<i>Medicago littoralis</i>	17	1.2	1.1	4.4
<i>Dactylis glomerata</i>	30	8.1	12.7	4.1
<i>Matthiola tricuspidata</i> *	4	0.0	0.0	3.9
<i>Lotus edulis</i>	15	0.5	3.0	3.3
<i>Lagurus ovatus</i>	19	0.1	0.8	2.1
<i>Limonium pandatariae</i> *	7	0.0	2.2	2.1
<i>Lobularia maritima maritima</i>	19	2.1	0.9	1.6
<i>Reichardia picroides</i>	19	1.3	1.1	1.6
<i>Bromus diandrus</i>	11	0.5	2.1	1.4
<i>Sonchus oleraceus</i>	22	1.0	0.4	1.1
<i>Brassica fruticulosa fruticulosa</i>	10	1.3	0.1	1.0
<i>Allium ampeloprasum</i>	24	0.4	0.4	0.9
<i>Bromus madritensis</i>	3	0.1	0.0	0.9
<i>Crithmum maritimum</i>	16	5.0	1.2	0.9
<i>Lavatera arborea</i>	10	0.4	0.2	0.9
<i>Trachynia distachya</i>	6	0.0	0.2	0.8
<i>Catapodium pauciflorum</i>	13	0.1	0.1	0.8
<i>Convolvulus arvensis</i>	5	0.0	1.2	0.7
<i>Convolvulus lineatus</i>	4	0.0	1.0	0.6
<i>Melilotus indicus</i>	4	0.0	0.2	0.4
<i>Sonchus bulbosus bulbosus</i>	14	0.3	0.3	0.3
<i>Mesembryanthemum nodiflorum</i> *	4	0.0	0.0	0.3
<i>Silene gallica</i>	9	0.1	0.1	0.2



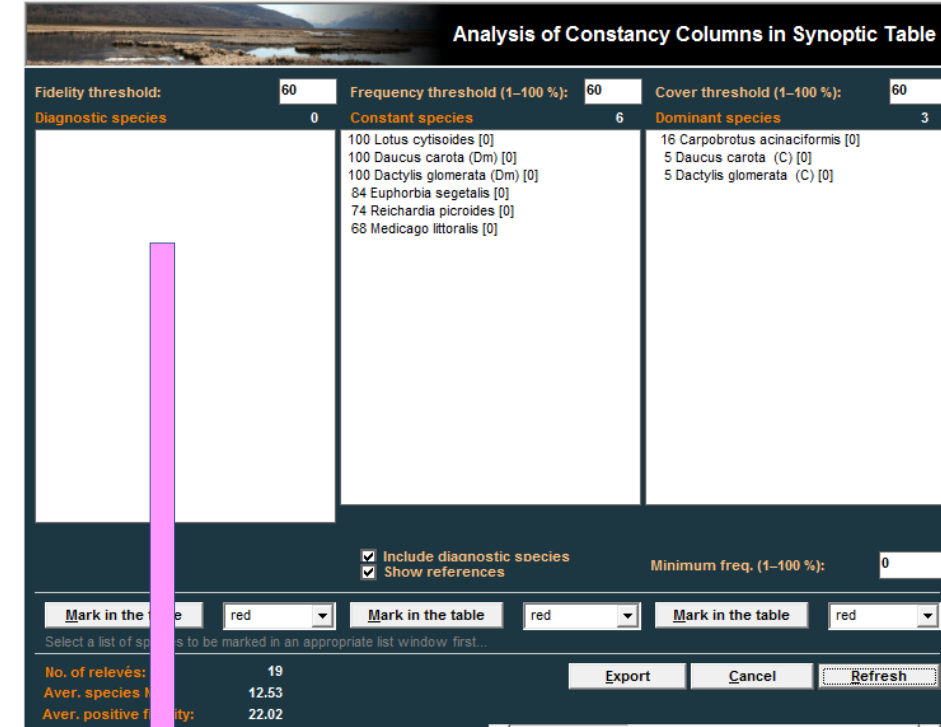
Cluster analysis on 43 plots identifies 3 main groups:



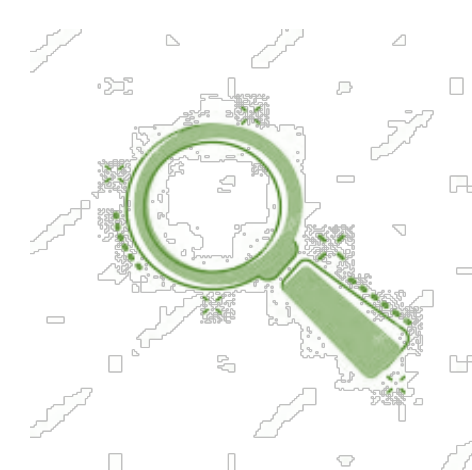
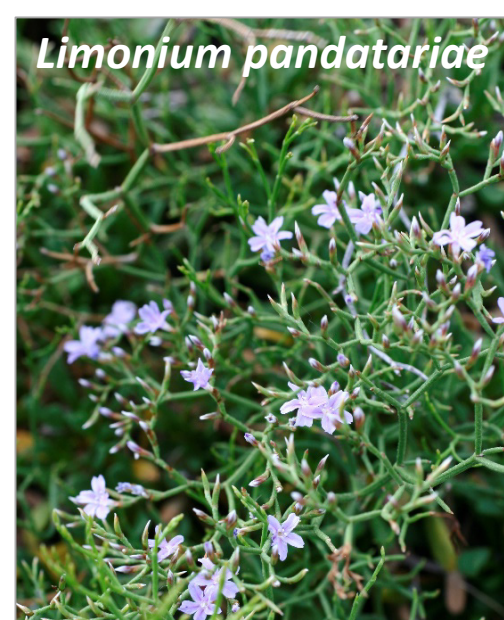
Group 1 includes control, invaded and eradicated plots → *Brachypodium retusum* dominated grasslands, where *Carpobrotus* (when present) cohabited with native vegetation. This group shows small differences in species composition before and after *Carpobrotus* removal



Group 2 consists of control and eradicated plots → Dry grasslands with annual species. This group shows rapid recovery of native vegetation, including rare or endemic species, after *Carpobrotus* removal



Group 3 is made of invaded. It has no diagnostic species because *Carpobrotus* invasion has caused dramatic loss of characteristic vegetation



- ✓ No *Carpobrotus* regeneration in eradicated areas
- ✓ Rapid and significant recovery of natural vegetation in eradicated areas
- ✓ New occurrence of *Matthiola tricuspidata* (regional Red List species) and *Mesembrianthemum nodiflorum* (native succulent) within eradicated plots