



LIFE13 NAT/ES/000586

LIFE CONHABIT ANDALUCÍA - Preservation and improvement in priority habits on the Andalusian coast

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| Duration | From 01/06/2014 to 01/06/2019 |
| Total budget | €2,654,268.00 (EC co-financing 60%) |
| Website | www.lifeconhabitandalucia.es |
| Coordinating beneficiary | Consejería de Medio Ambiente y Ordenación del Territorio (Spain) |
| Other partners | Agencia de Medio Ambiente y Agua de Andalucía (Spain) |
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Target species

Oenothera drummondii, *Opuntia dillenii*, *Agave sisalana*, *Agave americana*, *Acacia saligna*, *Arundo donax*.

Background and aims

The overall objective of this project is to promote the improvement and conservation of priority habitats in SCIs in Andalusian coast (southern Spain), implementing Directive 92/43/CEE. The main actions are: 1) Restoration and management of different habitats, to meet the urgent needs of conservation derived from not ordained public use, waste, expansion of invasive exotic species, habitat fragmentation, silvicultural work, forest fires. 2) Strengthen the role of society in the conservation of the coastal habitats through actions of raising social awareness.

Key measures and relative costs

Oenothera drummondii (Onagraceae): the project initially aimed at controlling the invasion at full scale. Given the environmental and social constraints of herbicide-based control, the initial strategy was considered unfeasible and was redefined towards containing the invading population by manual removal. Also, revegetation with native psammophilous plants was developed. Theoretical cost of the herbicide approach: €162,000/year; cost of plantation: €8,800; cost of the manual removal approach: €15,600/treatment (four treatments per year are required).

Opuntia dillenii (Cactaceae): the project aimed at controlling its invasion. Cost of the mechanical removal: ca. €22,500. *Agave sisalana* (Agavaceae): the project aimed at controlling its invasion in sensitive habitats. The social opposition raised during the initial stages of the project led to develop an awareness campaign based on local meetings with different stakeholders and with the use of social networks (Facebook, Twitter and the project website). Cost of the mechanical removal: ca. €20,000. *Agave americana* (Agavaceae), *Acacia saligna* (Mimosaceae) and *Arundo donax* (Poaceae): the project aimed at controlling their invasion. The cost of controlling them along 200 m was ca. €5,000.

Results

Oenothera drummondii: 1) the minimum effective dose of herbicide was calculated (20 g glyphosate/litre); 2) the current degree of invasion was estimated (123 ha); 3) environmental and social constraints of herbicide-based control were assessed; 4) cost assessment for herbicide application at full scale was implemented (€1,317/ha/year); 5) Manual removal of 30 ha was carried out. *Opuntia dillenii* and *Agave sisalana*: mechanical removal was carried out. *Agave americana*: combination of mechanical removal and cover with geotextiles to prevent resprout development. *Acacia saligna* and *Arundo donax*: combination of me-

chanical removal and selective application of herbicide to prevent resprout development.

Lessons learnt – *Oenothera drummondii*: the experience highlights the difficulties and constraints of controlling advanced stages of invasions.

Opuntia dillenii: the methodology applied is highly effective. Annual monitoring allow an effective control of resprouts. *Agave sisalana*: IAS can have a positive perception for local people. Awareness campaigns should be developed before, during and after the action. Loss of identity of native habitats and native plants can happen even for recent invasions (1940-1950).

Agave americana: the methodology applied is highly effective. Annual monitoring allow an effective control of resprouts.

Acacia saligna: one single application of herbicide is not enough for an effective control. Resprouts raise frequently. Monitoring every 6-12 months is recommended.

Arundo donax: geotextile cover of cut stems may be effective to control resprouts only if a double-layer is installed and covers more surface than the invaded area.

Sustainability of results

Oenothera drummondii: given the ability of this species to early produce flowers and fruits, manual removal will be effective if applied at a high frequency. The use of herbicides is not feasible within a protected area for large invasions (over 100 ha invaded). *Opuntia dillenii*: initial mechanical control followed by an annual monitoring (to remove small resprouts) is highly effective. The natural habitat revealed a positive recruitment of native plants in gaps created after removal of *O. dillenii*.

Agave sisalana: the frequency need for controlling resprouts is still unclear (the planned monitoring will shed some light on this knowledge gap).

Agave americana: mechanical removal is an effective method for removing this species.

Recommendations

In the particular case of *O. drummondii*, alternative methods should be explored. In the case of *Agave sisalana*, the loss of identity of natural structure and species composition of native ecosystems recommends to develop awareness campaigns not only during the course of the project but also prior to actions.

Fixed coastal dunes with herbaceous vegetation (“grey dunes”) invaded by *Oenothera drummondii* (Onagraceae). Huelva, Spain

