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RIVER RESTORATION ACTIVITIES IN NORTHERN ITALY IN THE CONTEXT OF CLIMATE CHANGE



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per la neerea in agneoitura i dell'economia agraria

Critical issues

Floodplains have been influenced by humans:

- Agriculture
- River constriction (river banks)
- Mining activities
- Urbanization
- Pollution from human activities













Extreme events caused by climate changes can cause damages on floodplain:

- Soil erosion
- Gravel deposition
- Damages on human activities



• Damages on infrastructure (road, bridge, ...)





Critical issues

Black poplar (Populus nigra L.)

- typical species of floodplain forests in Europe
- pioneer species







a threatened tree species in most European Countries



Opportunity

European Commission

- promote river restoration
 EU Floods Directive 2007/60/EC
 European Green Deal
- improve biodiversity
- EU Biodiversity Strategy 2030





European Forest Genetic Resources Programme (EUFORGEN)

• promote conservation of Populus nigra







At the Research Centre of Forestry and Wood in Casale Monferrato AL are maintained

- collections of about 2500 accessions of Poplars and Willows
- selections of autochthonous genotypes suitable for restoration





Opportunity

The Po River Park (... and others)



using funding from Rural Development Programs (RDP),

on private and public land

plans to carried out restoration plantations





Restore an ecosystem to its natural pre-disturbance structure and function ...

- ... it is a reversion to its natural conditions ...
- ... it is carried out to compensate or mitigate the human impact in favor to river ecosystems...
- ... should have definite objectives that will convert the site from the <u>present</u> condition to the <u>natural</u> condition





- to convert agricultural lands into riparian forests
- to stop degradation natural floodplain heritage
- to restore floodplain for recreational purposes
- to minimize risk of flooding
- to create riparian corridors
- to restore river dynamics



- to test different plant materials, planting methods and management techniques
- to support a *in-situ* dynamic conservation of Populus nigra







- abandoned agricultural land
- presence of alien invasive species (Sycios angulatus, Solidago gigantea, Humulus scandens, Reynoutria japonica)
- poor soil (sandy sometimes with gravel)
- drought during the vegetative season









• Soil preparation (mechanical shovel, forestry mulcher)





... holes opening with auger carried by tractor ... (the layout of planting in not linear, follow river bends)





... preparation and transport of planting material ...







... plantation ...

to ensure water availability during the drought period hydrogel has been added in the hole before planting





... cultural operation during the first 2 or 3 years ... local irrigation as needed, weed control between rows (flail mowers) and localized (grass trimmers, ultra-low volume sprayer)









Results

150 hectares have been restored in 30 sites





Results

Survey in 10 hectares (about 1800 trees)

- age ranging from 11 and 17 years
- mortality rate 40 %
- total height 23 m
- growth increment 18 m³ ha⁻¹ year⁻¹





- native poplars can be successfully used in establishing plantations in fluvial ecosystems
- natural evolution of forests can be setup in a short time
- increasing biodiversity
- preventing frequent erosive events
- supporting a natural regeneration of black poplar
- creating opportunity for recreational activities



Conclusions

Cooperation with students:

cuttings preparation





Conclusions

Cooperation with students:

nursery establishment







Cooperation with students:

nursery establishment





Conclusions

Cooperation with students:



plantation





... thank you for attention piermario.chiarabaglio@crea.gov.it

