Value of deep-sea ecosystem restoration:
Dohrn Canyon in the Bay of Naples, Italy
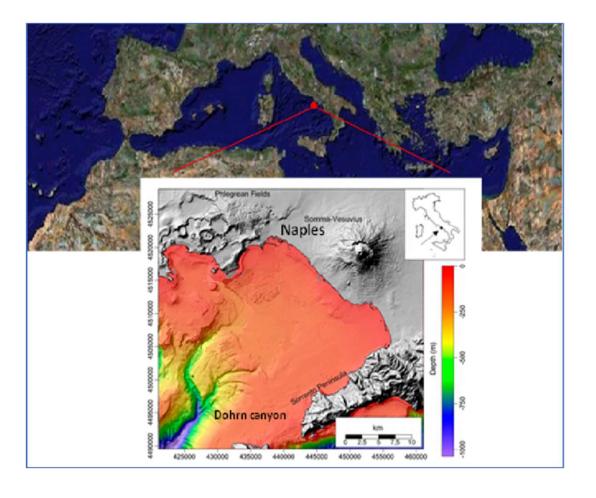
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EU MAIA Marine Accounting Workshop
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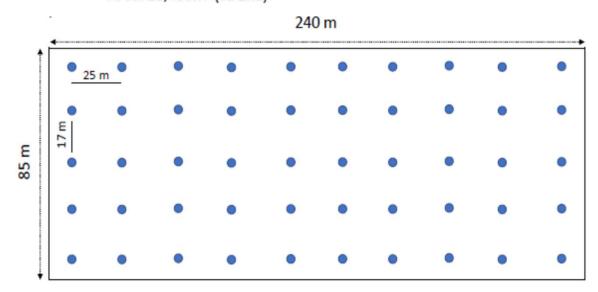# Dohrn Canyon in the Bay of Naples

Restoration of the Dohrn Canyon

2 hectars MPA and active restoration activities to restore deep sea coral reefs and related ecosystem

Area: 20,400m² (ca 2ha)

Source:Cristina Gambi, UNIVPM

The Autonomous Reef Monitoring Structure Unit (ARMS) before and 2 years after deployment. This is an example from the shallow water.
Source:Cristina Gambi, UNIVPM

How much is the non-market value for the deep sea ecosystem restoration of the Canyon?

- Attitudes to marine ecosystem restoration
- Contingent Valuation Approach
  - Approach relies on using stated preferences of surveyed individuals in Italy to model national Willingness to Pay Distribution for restoration of Dohrn Canyon

  - Stated Preferences elicited using single bid discrete choice format (recommended by NOAA panel)

Contingent Valuation Scenario

- A restoration and monitoring plan implemented in the Dohrn Canyon that achieves the following:

Management Plan Attribute	Level achieved after restoration
Biodiversity (abundance of animals such as fish, starfish, corals, worms, lobsters, sponges & anemones).	High – back to pristine habitat levels for the canyon
Density of Marine litter on canyon floor	Good (only 0 to 1 item of litter per km^2)
Size of protected area in canyon	20,000m^2 (3 soccer pitches)

Summary Statistics

- Representative sample of 1,060 individuals from across Italy

	Mean	Std. Dev.
Age	40.55	11.86
Female	0.51	0.50
Have third level education	0.36	0.48
Married	0.44	0.50
Single	0.32	0.47
Have children	0.52	0.50
From Napoli	0.01	0.12
From Central Italy	0.19	0.39
From Islands	0.12	0.32
From North Eastern Italy	0.19	0.39
From Northwestern Italy	0.26	0.44
From Southern Italy	0.24	0.43
Fulltime employed	0.46	0.50
Parttime employed	0.17	0.38
Currently a student	0.09	0.29
Retired	0.03	0.16
Unemployed	0.13	0.34
Visited seashore in last 12 months	0.80	0.40

Estimated mean willingness to pay per person per year

	Mean WTP Per Person	[95% Confidence Interval]
Sample Selection Model	€ 34.69	[15.94, 53.43]

- Results from a representative sample of 1,060 individuals drawn from the general Italian population.
- The results also indicate the importance of accounting for protest zero bidders in contingent valuation studies, especially when the environmental good is relatively unfamiliar to respondents.

Research article

Estimating the non-market benefit value of deep-sea ecosystem restoration: Evidence from a contingent valuation study of the Dohrn Canyon in the Bay of Naples

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ARTICLE INFO

ABSTRACT

It is increasingly recognized that restoration actions in marine environments are required in order to deal with continued habitat degradation and to support conservation strategies. Restoration success is judged on the ecological outcomes but with limited resources the magnitude of the societal benefits achieved is an important consideration for policy makers. This study demonstrates how the potential non-market benefit value of a deep-sea restoration project might be assessed. The contingent valuation method is employed to elicit the Italian population's willingness to pay for the restoration of the Dohrn deep-sea canyon in the Bay of Naples. Sample selection models that control for the impact of protest zero bidders on benefit value estimation are compared to more traditional modelling approaches. The results indicate a positive willingness to pay for the restoration of the canyon ecosystem and the importance of accounting for protest zero bidders in contingent valuation studies, especially when the environmental good is unfamiliar to respondents. The paper argues that the inclusion of non-market benefit values is particularly important in assessing the potential for marine ecosystem restoration if a true reflection of the value to society of restoring such habitats are to be correctly captured.
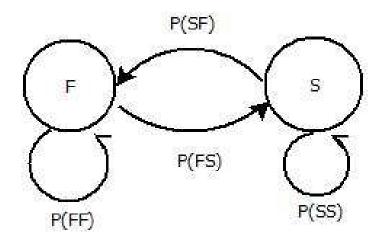
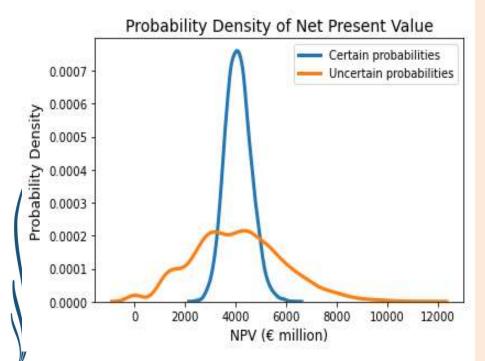# When successful rate of restoration is uncertain and will affect the expected benefits of restoration

- A Markov model is develeped

- Expert oppinion was used to estimate the transition probababilities.

Social Cost Benefit Analysis Dohrn Canyon in the Bay of Naples

Probability Density of Net Present Value

Source: Chen, W, Wallhead, P. et al. 2021 under review

- **A 10 year restoration project with 50 landers**

- **Total restoration costs is ca. 0.5 € mill**

- **Uncertainties associated with restoration success rate is high**

- **A Markov modelling approach based on expert opinion is used to assess long term success of upscaling and net economic benefits.**

- **Uncertain success rate affects the probability density distribution of NPV significantly.**

Conclusion

- Ecosystem accounting will be important to study the effects of restoration on the ecosystem and ecosystem services and values, both ex-ante and ex-post.

- Restoration has been mentioned as a potential area for SEEA EEA

- Restoration costs are very much different from the non-market ecosystem service benefits

- Restoration projects are largely under funded, which means the restoration expenses will not correctly reflect the value of ecosystem services and natural capital

- As many ecosystem services cannot be traded in the market, it is important to consider the non market benefits of ecosystem restoration.

MERCES

Thank you!

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