



Integration of ecosystem services in EU Member States: the case of Malta

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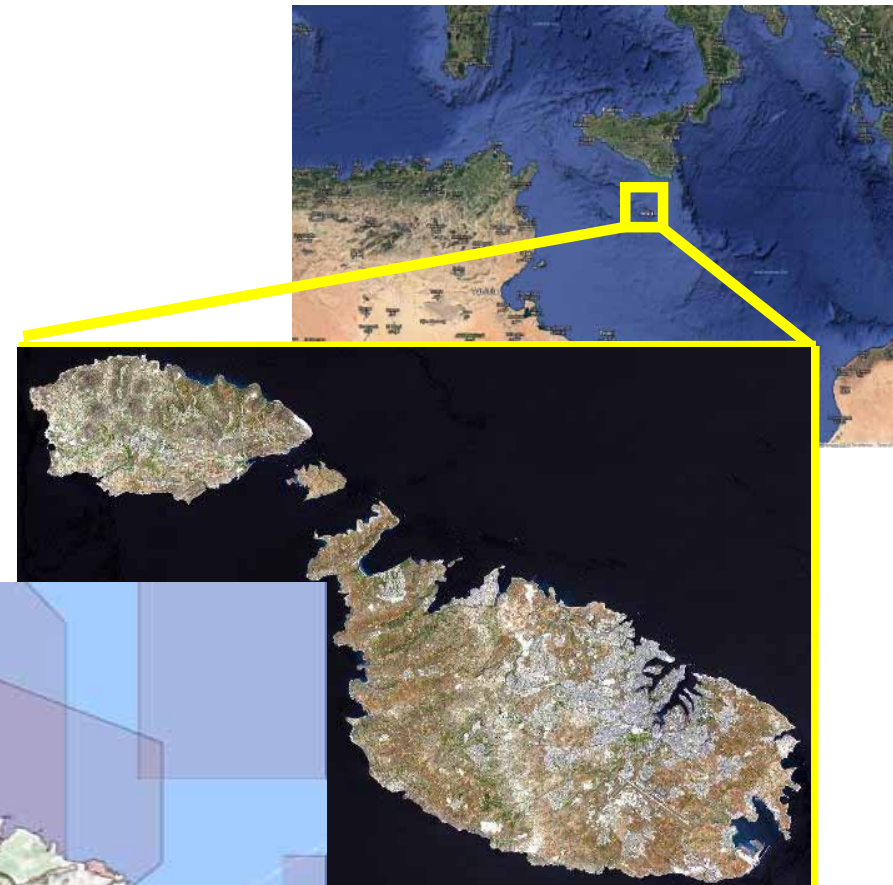
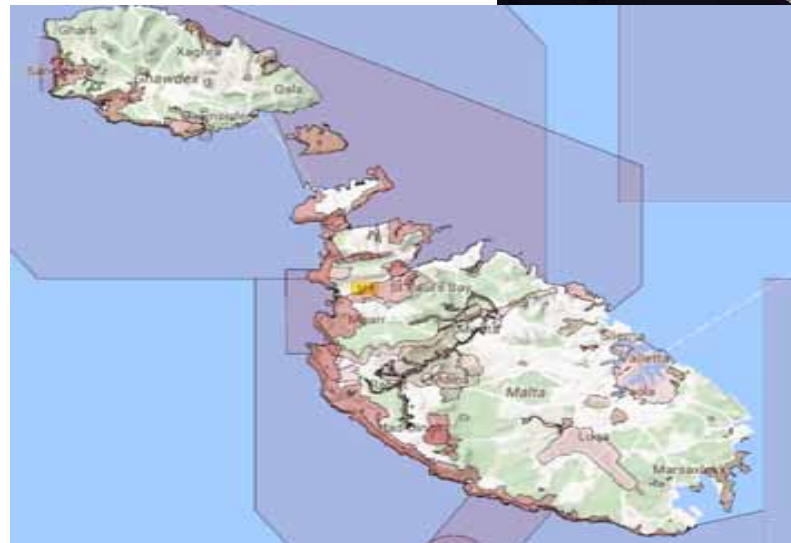
Testing the MAES approach

An archipelago with an interesting biogeography, high biodiversity;

But, long cultural history; agricultural land cover is approximately 50%; around 30% of the land is built-up

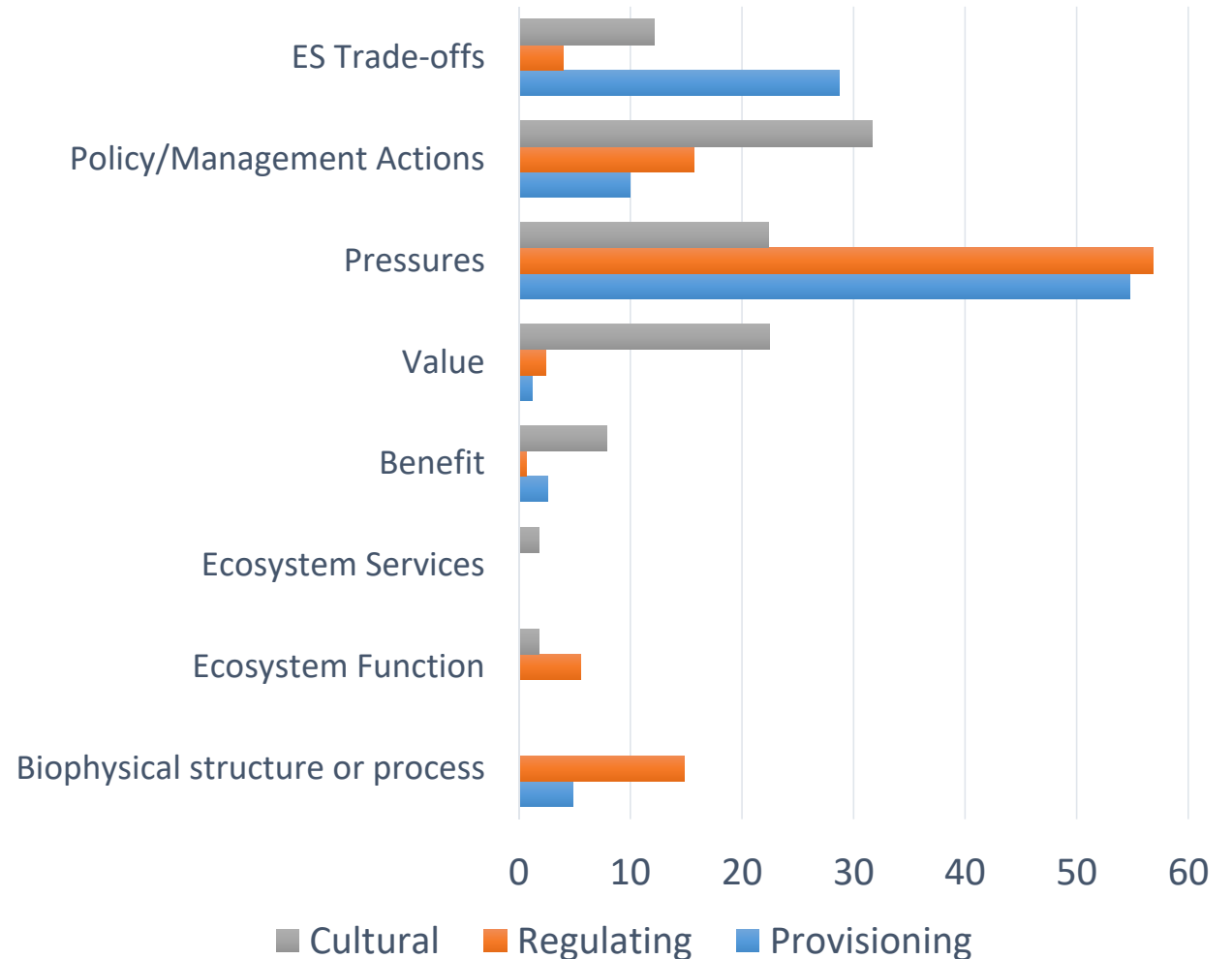
Strong urbanisation and tourism trends; highest population density

*An interesting test for the application of the ecosystem services (ES) concept –
ESMERALDA case-study*



Existing literature about islands and ES

- Most have focused on the management of ecosystems, and pressures arising from human activities.
- But studies carrying out biophysical assessment, socio-economic valuation, or which investigate synergies and trade-offs, were very few (Balzan et al., 2018a).
- Few studies making the link between ecosystem assessment, policy and human benefits.



Policy Context for ES assessment in Malta

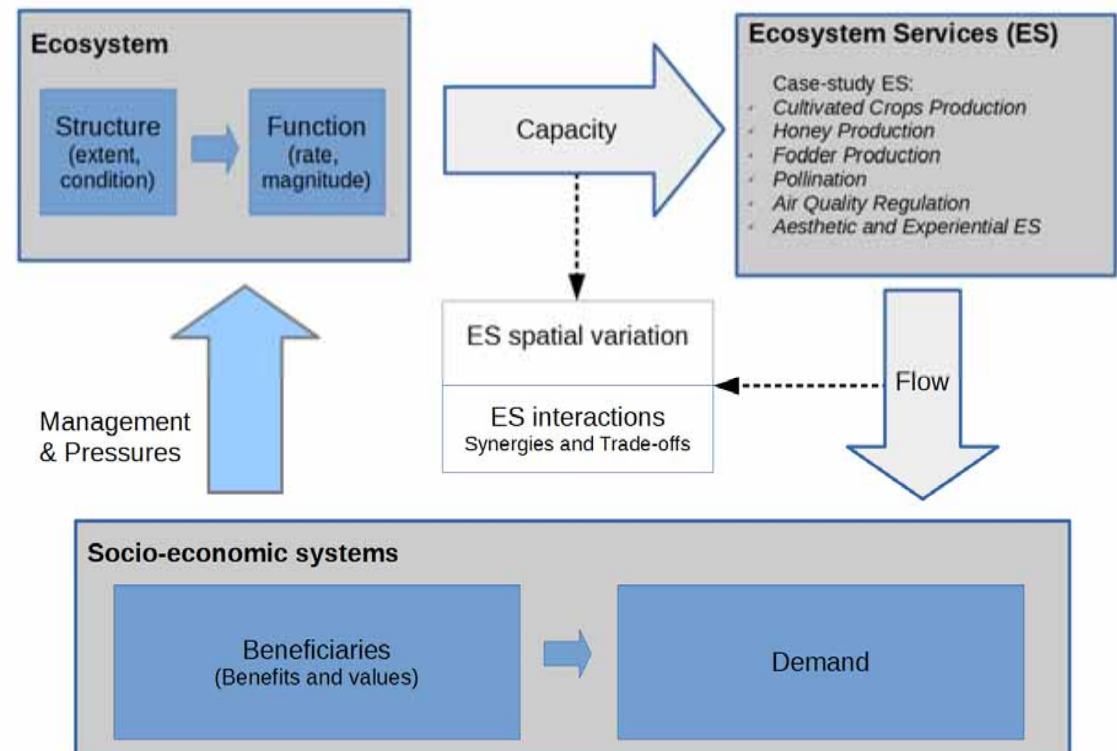
- The policy context for ES assessment in Malta is based on targets within the NBSAP, which
 - 1) recognises the need to develop the knowledge base about biodiversity, its values, functioning, status and trends, and consequences of its loss (Target 18);
 - 2) recognises the value of biodiversity and ecosystem services, and opportunities derived from their sustainable use, and to integrate these in national policies, as well as decision-making and planning processes (Target 2)
 - 3) aims to restore at least 15% of degraded ecosystems and for the essential services provided vulnerable ecosystems to be safeguarded (Target 13)

ESMERALDA

ESMERALDA has provided a **first opportunity to test-case the implementation of ES** mapping and assessment in Malta;

Development of a conceptual framework (right)

Identification of challenges – e.g. relating to the availability of data at fine spatial scale and for data relating to the identification and condition of ecosystems, and the actual use of the service (Balzan et al., 2018b).



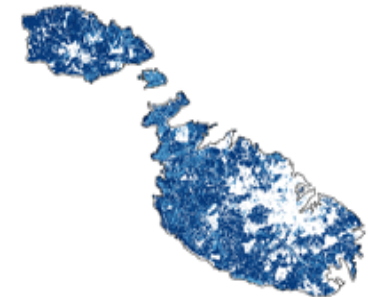
ESMERALDA Malta Case-study



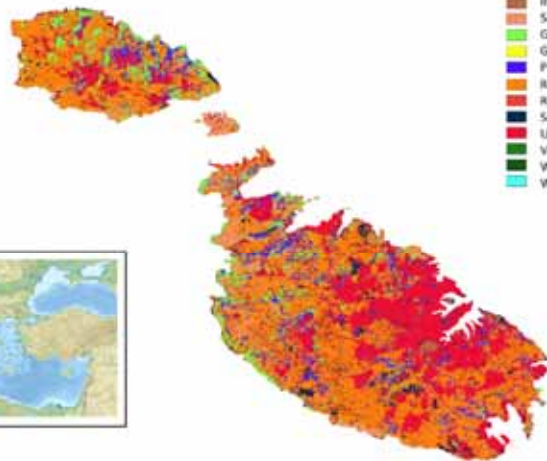
Fodder Provisioning



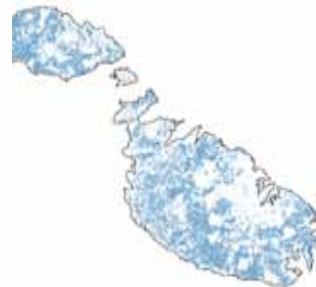
Crop Provisioning



Honey Production



- LULC Classes**
- Irrigated Crop
 - Sclerophyllous vegetation
 - Grassland/Steppe
 - Greenhouses
 - Permanent Crops
 - Rainfed Crop/Fallow
 - Roads
 - Scarcely Vegetated Land
 - Urban Areas
 - Vineyards
 - Woodland
 - Wetlands



Pollination



NO₂ Deposition Velocity



NO₂ removal flux



Gene Pool Protection



Aesthetic value

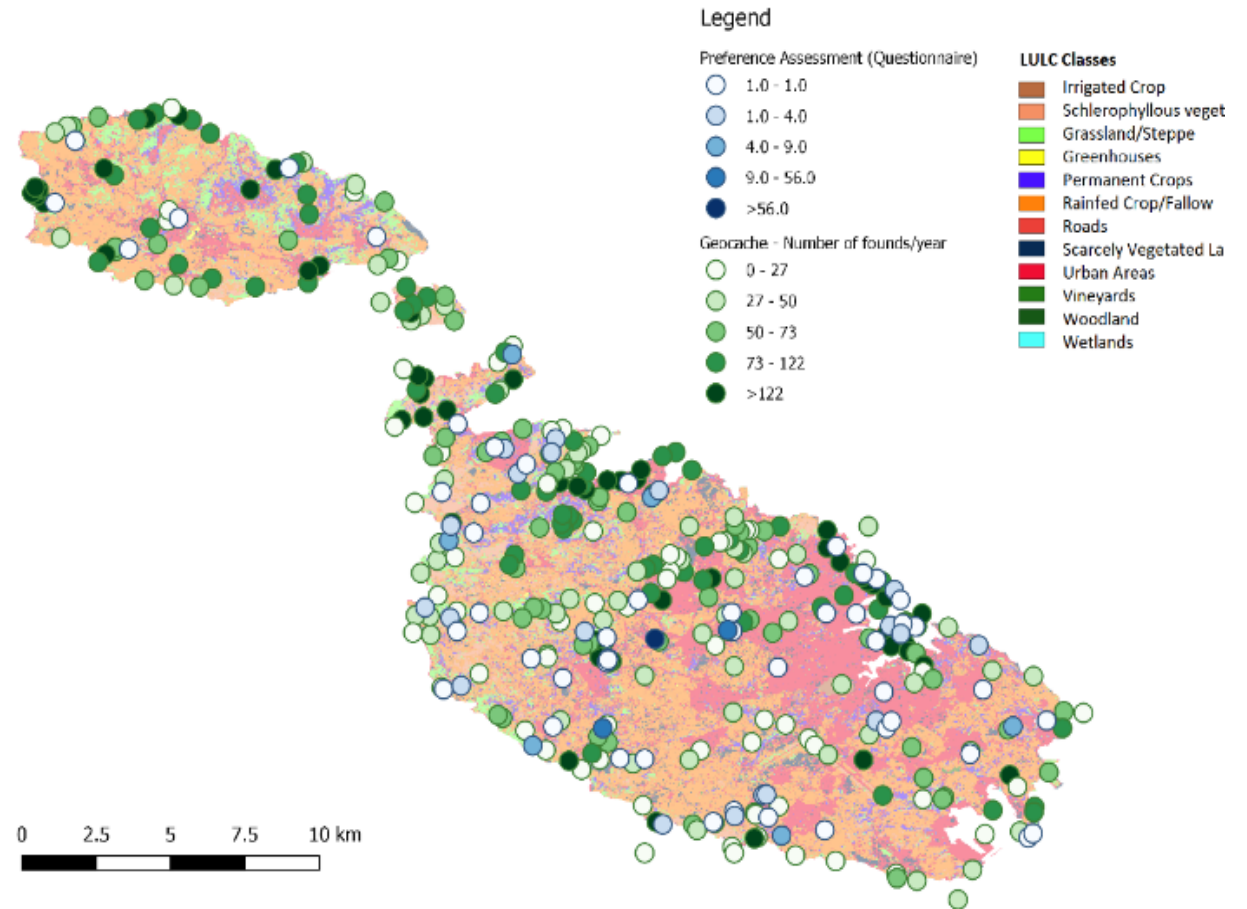
Mapping ecosystem services

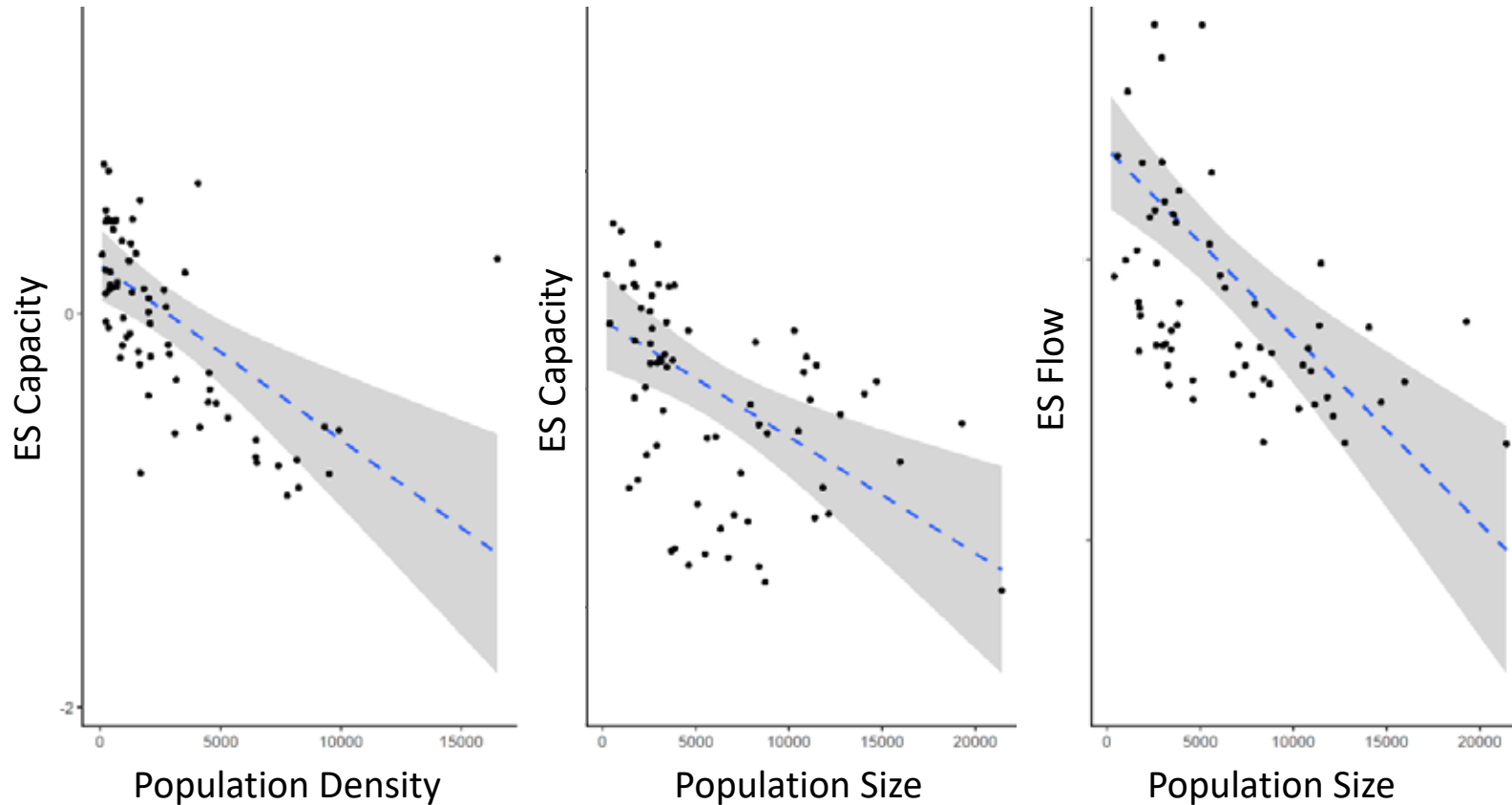


*Mapping ecosystems using Sentinel 2 images
(based on MAES Urban Ecosystems typology)*

Recreational Ecosystem Services

Mapping recreational ecosystem services. Different approaches have been used given that often the data available does not provide a complete overview of the use of ecosystems for recreation. The map shown here includes two datasets on the use of ecosystems for recreation (1) from a questionnaire with 283 residents and (2) using geocache data (base map: Balzan et al., 2018b; geocaching data: Balzan and Debono, 2018).





Linking ES Capacity and Flow to Population Parameters

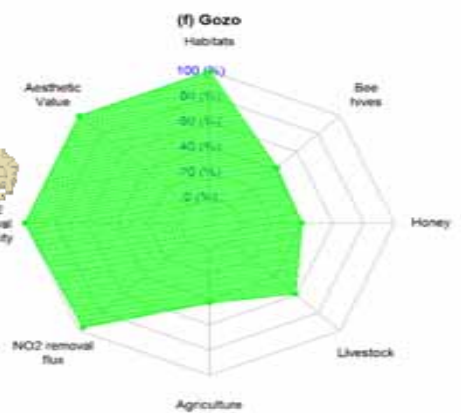
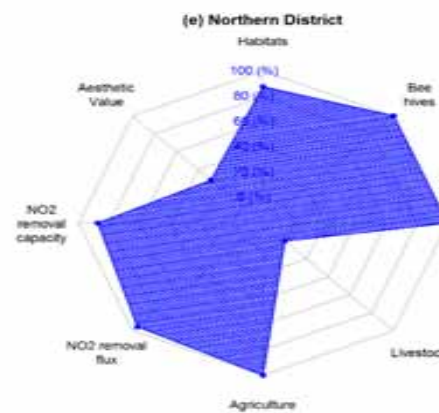
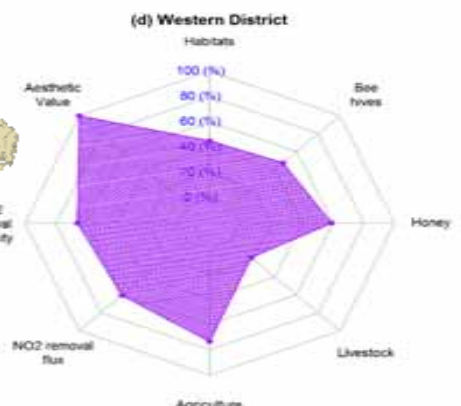
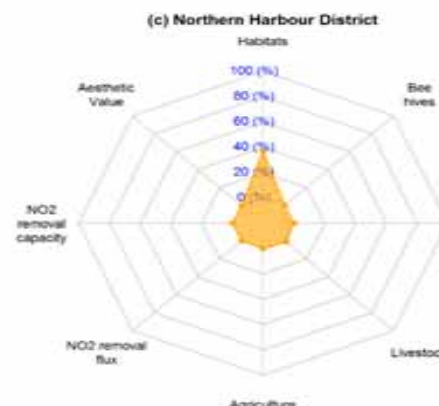
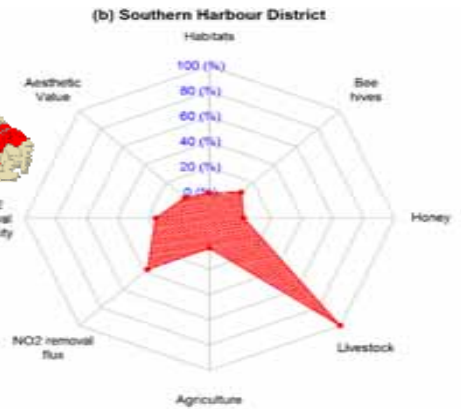
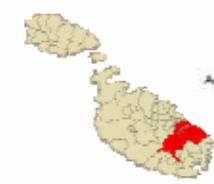
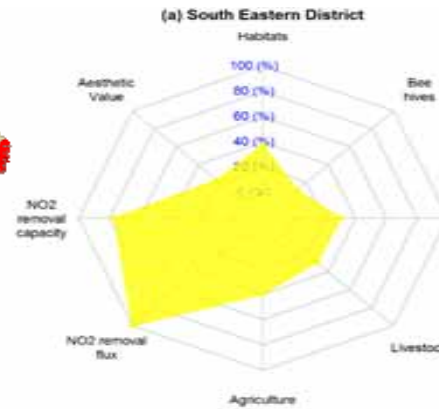
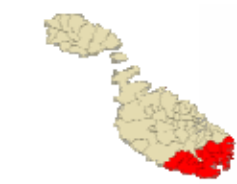
Scatterplots presenting the association between (a) ES capacity and population density, (b) ES capacity and population size and (c) ES flow and population size for local councils in Malta. Lines represent the linear regression function and 95% confidence intervals plotted on the scatterplot.

Spatial variation of ES

ES are strongly associated to the LULC category;

This translates in spatial variation in ES capacity and flow;

ES tend to occur/become unavailable together within certain regions.



Dissemination and knowledge exchange

ESMERALDA offered an opportunity to develop a collaborative relationship with national MAES policy-makers from the Environment & Resources Authority.

Moreover, we have been working with the Planning Authority to facilitate application of knowledge generated in local plans which are currently being revised (e.g. through the project EnRoute).

Roundtable discussion with policy-makers, businesses and NGOs.



The 'Evidence-based Planning for Greener Cities' conference

ReNature Malta (and Europe)

promoting Research Excellence in NAture-based soluTions for innovation, sUstainable economic GRowth and human wELL-being in Malta (ReNature)

- Strong support of the public for nature-based solutions;
- Key objectives: capacity building; participatory processes and knowledge synthesis; open data generation and sharing; transition of research into practical solutions
- Key themes: sustainable ***landscape design and planning; evidence-based policy***; developing a ***National Research and Innovation Cluster***

Conclusions

- Key spatial trends in ecosystem service capacity and flow have been identified;
- Urban areas appear to be associated with low capacity and flow of ecosystem services;
- But urban ecosystem providing a higher flow per unit area;
- The development of nature-based solutions in urban areas strongly favoured by the general public.
- Ecosystem condition and ecosystem service assessments can serve as a basis for the development of nature-based solutions across a rural-urban gradient.

More information and ES Malta publications

- Balzan MV, Debono I (2018) Assessing urban recreation ecosystem services through the use of geocache visitation and preference data: a case-study from an urbanised island environment. *One Ecosystem* 3: e24490. DOI: [10.3897/oneeco.3.e24490](https://doi.org/10.3897/oneeco.3.e24490)
- Balzan M.V., Caruana J. & Zammit A. (2018) Assessing the capacity and flow of ecosystem services in multifunctional landscapes: evidence of a rural-urban gradient in a Mediterranean small island. *Land-Use Policy*. DOI: [10.1016/j.landusepol.2017.08.025](https://doi.org/10.1016/j.landusepol.2017.08.025)
- Balzan M.V., Potschin-Young, M & Haines-Young, R. (2018) Island Ecosystem Services: insights from a literature review on case-study island ecosystem services and future prospects, *International Journal of Biodiversity Science, Ecosystem Services & Management*, 14:1, 71-90, DOI: [10.1080/21513732.2018.1439103](https://doi.org/10.1080/21513732.2018.1439103)