

# Assessing and mapping ecosystem services in a small islands state



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# SGA Mentoring Scheme



## Key objectives:

- 1) Develop a methodology for mapping ecosystem services (ES) in a small islands state;
- 2) Develop and apply a framework for ecosystem accounting in a small islands state;
- 3) Apply biophysical and social assessment methods for mapping ES;
- 4) Distinguish between different valuation tools;
- 5) Implementation of developed ecosystem accounting framework for a broad range of ES

PD Dr Marion Potschin (Mentor),

Prof. Roy Haines-Young,

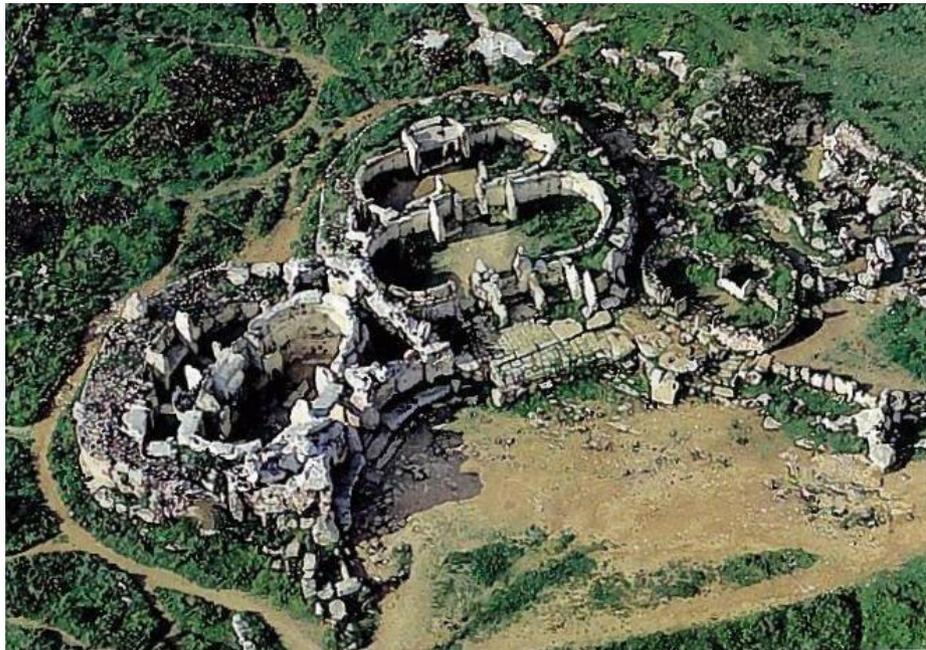
*Centre for Environmental Management, School of Geography, University of Nottingham, UK*

# Small Islands

- Islands as 'pieces of lands surrounded by water'
- But are characterised by high inherent diversity of geomorphological, biotic, socialcultural and economic characteristics;
- Various definitions of islands that fit different needs:
  - *Within the MA islands systems were defined as populated islands with more than 0.15 square kilometres of surface area and up to the size of Greenland (Wong et al. 2005).*

# Small Islands

- Islands as 'laboratories' of natural and cultural processes



Mnajdra temples, Malta (Photocredit: <http://unescopostcard.blogspot.com/>)



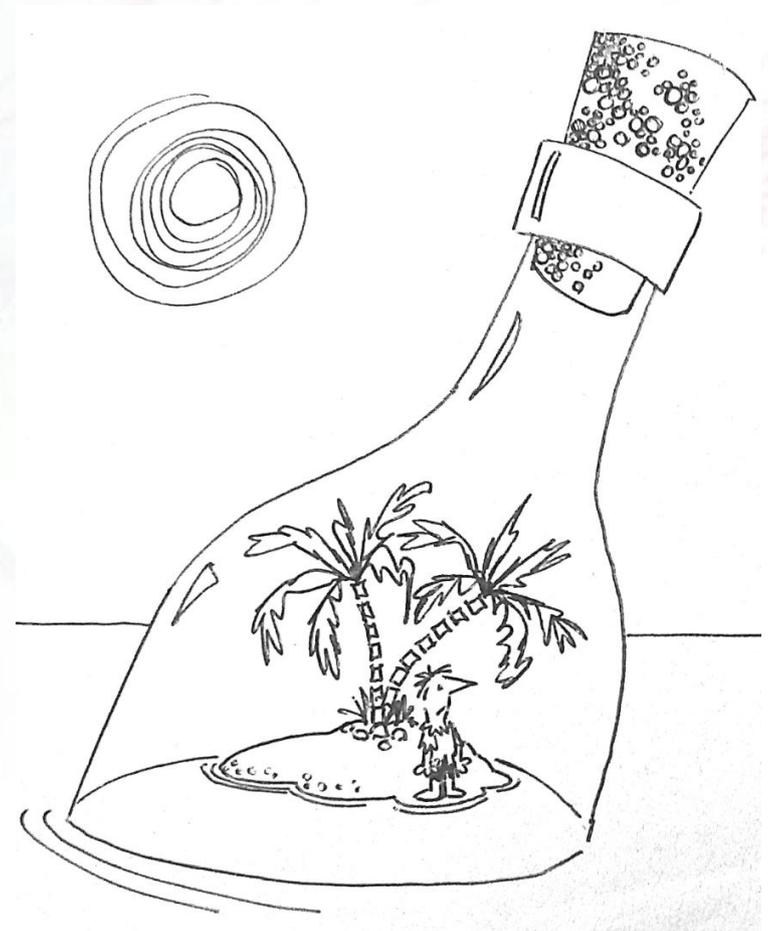
*Helichrysum melitense*, Malta  
(Maltapost stamp)



*Papilio machaon melitensis*, Malta  
(Photocredit: <http://swallowtails.net/>)

# Small Islands – a special case for SD?

- small population and economy,
- restricted usable land area,
- isolation from and yet dependence on external market,
- high cost of transportation,
- susceptibility to natural disasters and climate change, and
- a constrained adaptation capacity



(Photocredit: [briansibleysblog.blogspot.com](http://briansibleysblog.blogspot.com))

# Small Islands – a special case for SD?

- Concurrently, islands often support numerous discrete and interlinked ecosystems that provide ES necessary for the well-being of inhabitants.

# Methods

## 1. Literature Review:

- Status and trends of ecosystem services in small islands:
  - Recreation and eco-tourism
  - Food provisioning
  - Other ES

## 2. Ecosystem accounting framework of ES in the Maltese Islands (Central Mediterranean)

# Literature Review

- **Recreation and eco-tourism:**
  - Islands often touted for their potential to provide cultural ES, in the form of recreation and/or ecotourism;
    - Important for development and economic growth;
    - Provide employment and promote conservation

# Literature Review

- Several case-studies where unsustainable habitat alteration leads to degradation of ecosystems and exhaustion of natural resources: E.g. Loss of coastal habitats leading to increased erosion rates; augmented energy and freshwater demand;
- But ecosystems that provide recreational and eco-tourism services are also impacted upon by multiple anthropogenic stressors (e.g. fisheries harvest, agricultural/industrial pollution) and natural forcing (e.g. climate change and disease epidemics).

# Literature Review

- **Food Provisioning**
  - Many small islands depend on trade for achieving food security;
  - Inability to compete in international markets due to economies of scale;
  - Poorer small islands developing states dependent on agricultural sector (FAO 2004);

# Literature Review

- Improved garden and agricultural production and the maintenance of freshwater resources were the highest ranked management strategies in island communities with a strong dependence on local food production (Kenter et al. 2011);
- In contrast in several Mediterranean islands areas that tend to be less productive are increasingly being abandoned (Aretano et al. 2013; Cyffka & Bock 2008)

# Literature Review

- Degradation of natural resources:
  - Intensification of agriculture and associated increase in exports, has been observed to be associated with an abrupt increase in the import and usage of agricultural chemicals (van der Welde et al. 2007).
  - Unsustainable natural resource use for the short-term enhancement of agricultural yield has increasingly led to a breakdown in traditional species-rich agro-ecosystems and the loss of their agrobiodiversity and ecosystem functions is one of the most rapidly emerging threats to food and livelihood security in SIDS (UNEP, 2014)

# Maltese Islands



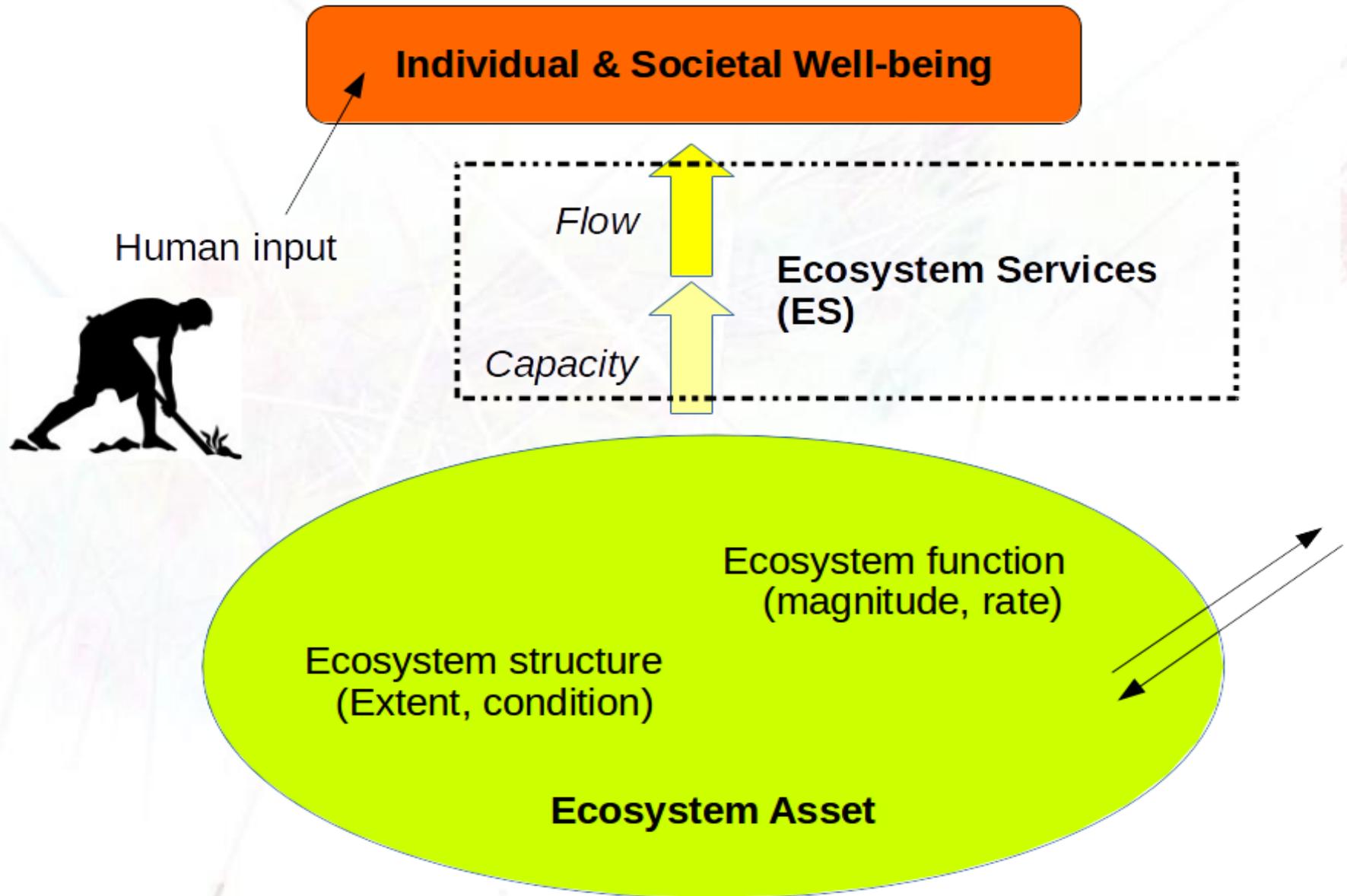
- ✓ Land surface area: 316km<sup>2</sup>
- ✓ Fisheries Management Zone: extending to 25 nautical miles around the Maltese archipelago;
- ✓ High population density (1274 people/km<sup>2</sup>)
- ✓ Important tourism industry (1.44 million tourists in 2012)

Mediterranean Basin (Source: Google Maps, 2014)

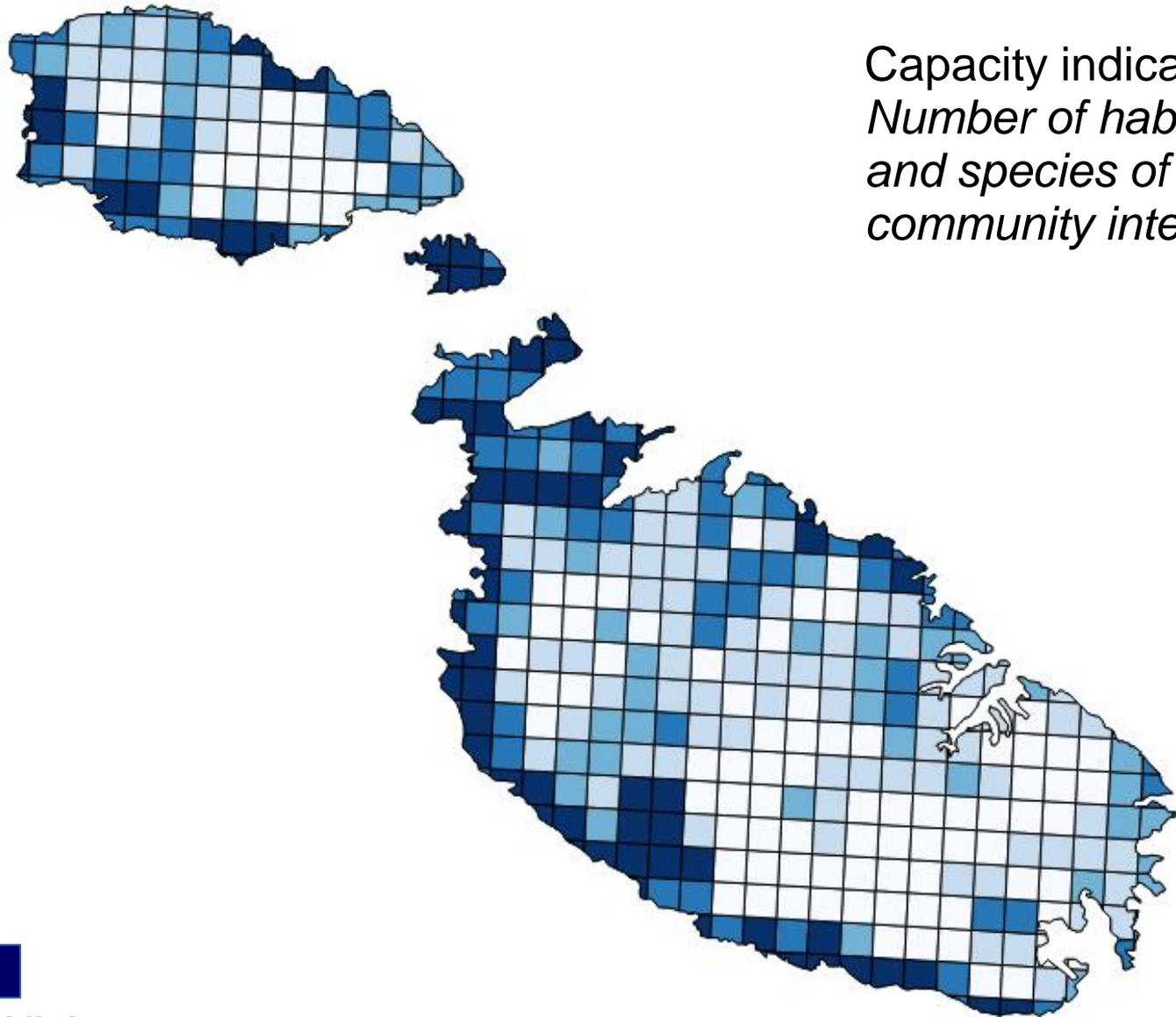


Maltese Archipelago (Source: NASA, 2010)

# Ecosystem Accounting Framework



# Preliminary Results



Capacity indicator:  
*Number of habitats  
and species of  
community interest*

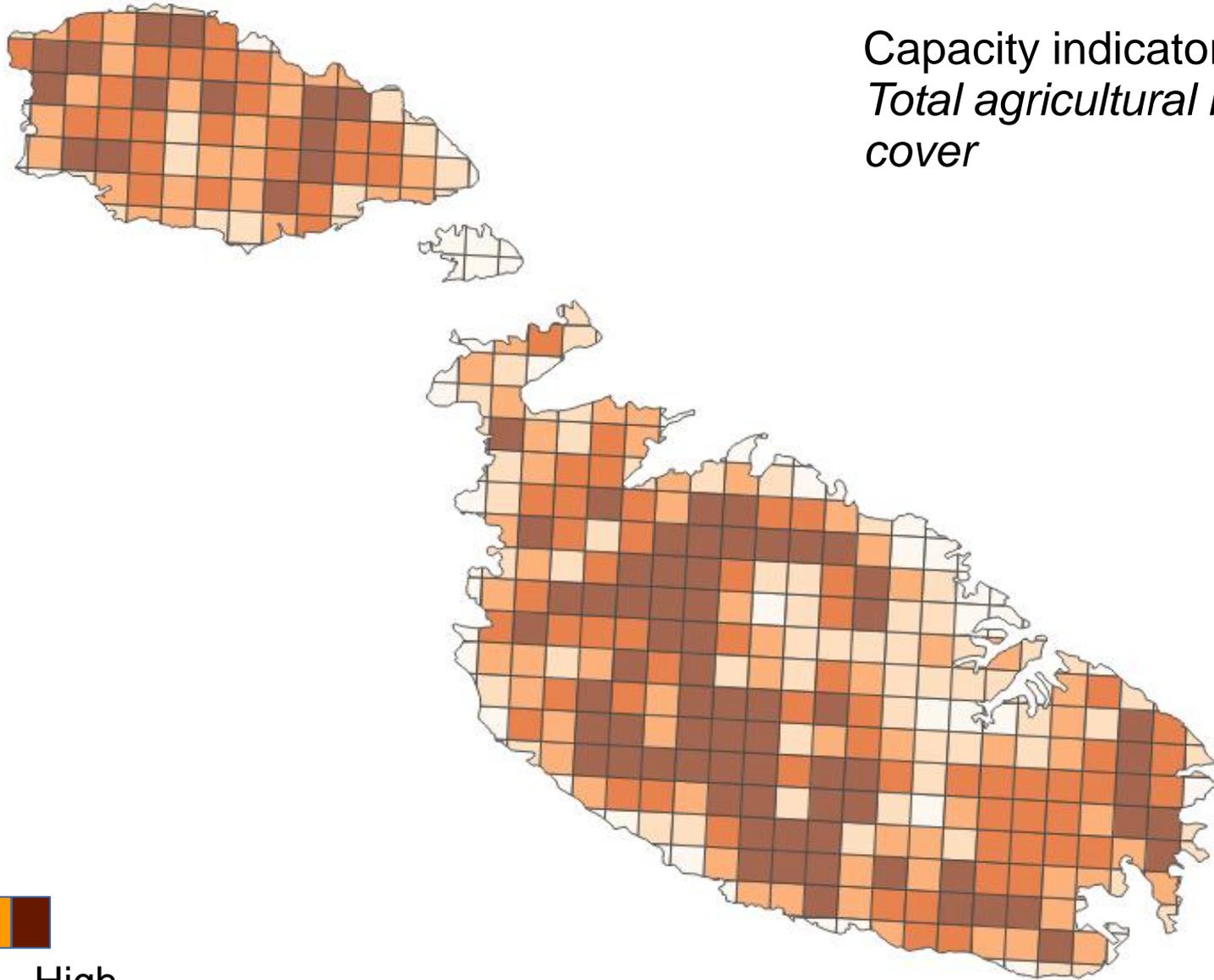


Low

High

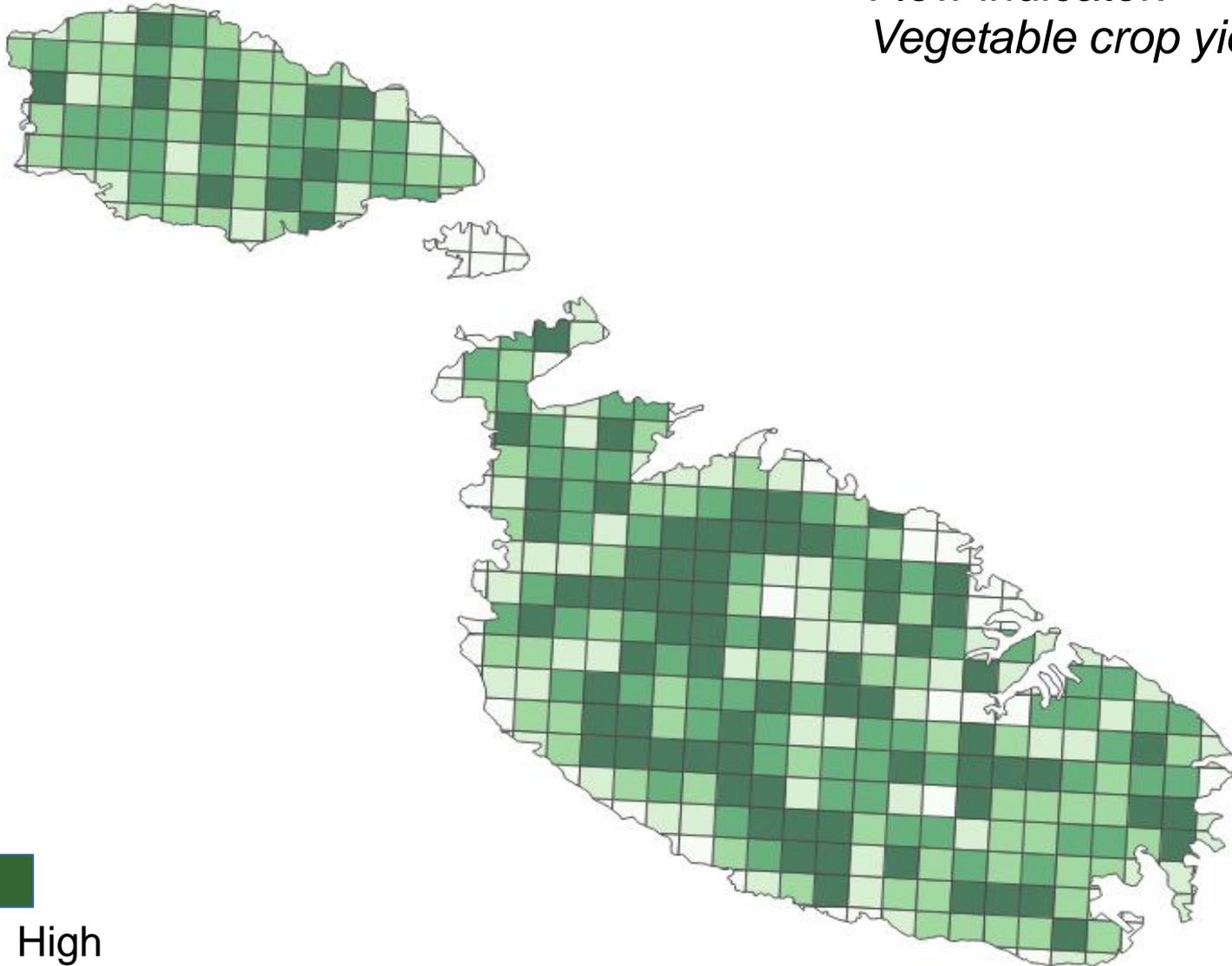
# Preliminary Results

Capacity indicator:  
*Total agricultural land cover*



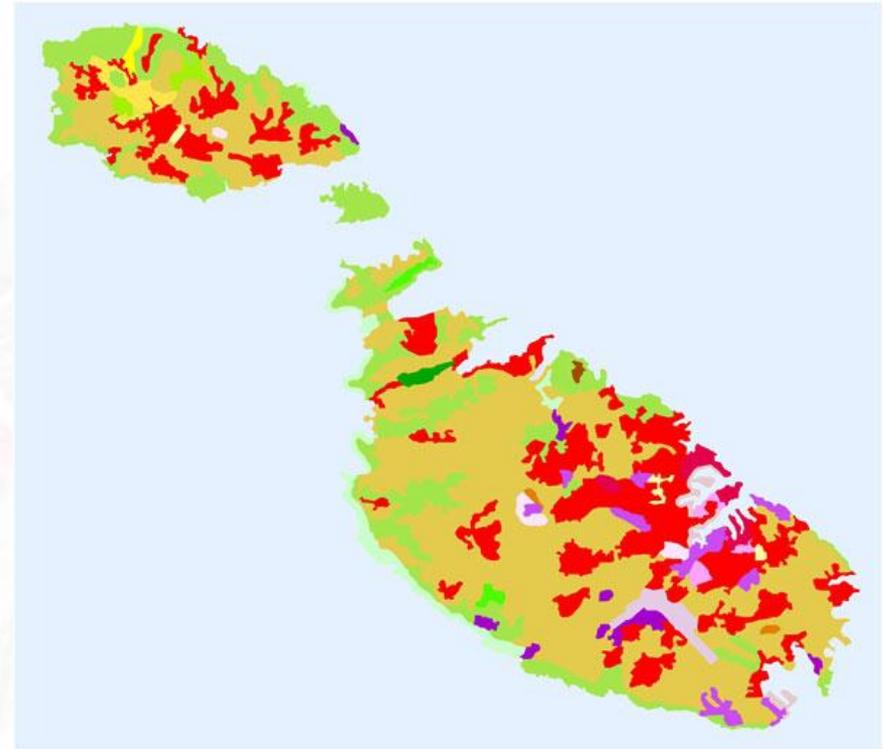
# Preliminary Results

Flow indicator:  
*Vegetable crop yield*



# Key Challenges

- Availability of spatial data at relevant scales;
- Downscaling national/local council data;
- Scale of existing spatial data (e.g. CLC)



Corine Land Cover 2000 for Malta

# Preliminary Conclusions

- Sustainability of small islands is likely to be achieved if, rather than focusing on a single ecosystem service/benefit (e.g. fisheries/crop yield or the cultural values associated with island landscapes) the flow of a broader set of ES is maintained.
- Need for ecosystem assessments that investigate the capacity of ecosystems to provide bundles of ES, the flow of these to island communities and associated trade-offs.

*Thank you*

