

Rationalising Biodiversity Conservation in Dynamic Ecosystems

A Conceptual Framework for Assessing the Impacts of Environmental Change on Ecosystem Services

Dr. Paula Harrison

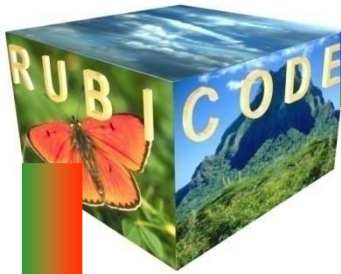
Environmental Change Institute, University of Oxford

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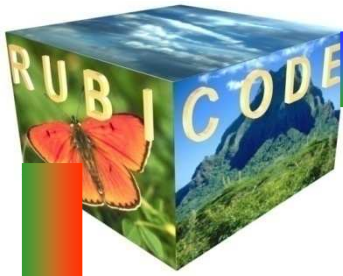
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Partners

- Environmental Change Institute, University of Oxford, UK
- ALTERRA Wageningen UR, The Netherlands
- Median SCP, Spain
- Prospex bvba, Belgium
- University of Lund, Sweden
- University of Aegean, Greece
- University of Edinburgh, UK
- Slovak Academy of Sciences, Institute for Forecasting, Slovakia
- University of Duisburg-Essen, Germany
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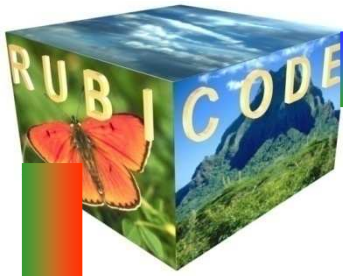


RUBICODE: Coordination Action

Coordination Actions aim to achieve improved integration of European research through the coordination of existing research initiatives or projects for a specific purpose.

RUBICODE activities:

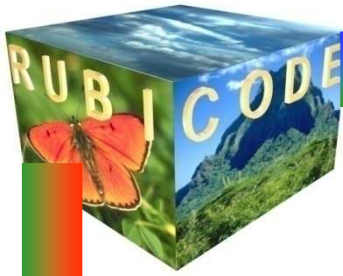
1. To review relevant concepts, methods and results from previous and ongoing projects, the literature, databases, experts and policy documents.
2. To organize workshops to evaluate the concepts and methods, raise awareness and identify gaps in knowledge.
3. To synthesize knowledge from (1) and (2), and further develop various concepts, frameworks or strategies to address gaps in knowledge and inform future research needs.



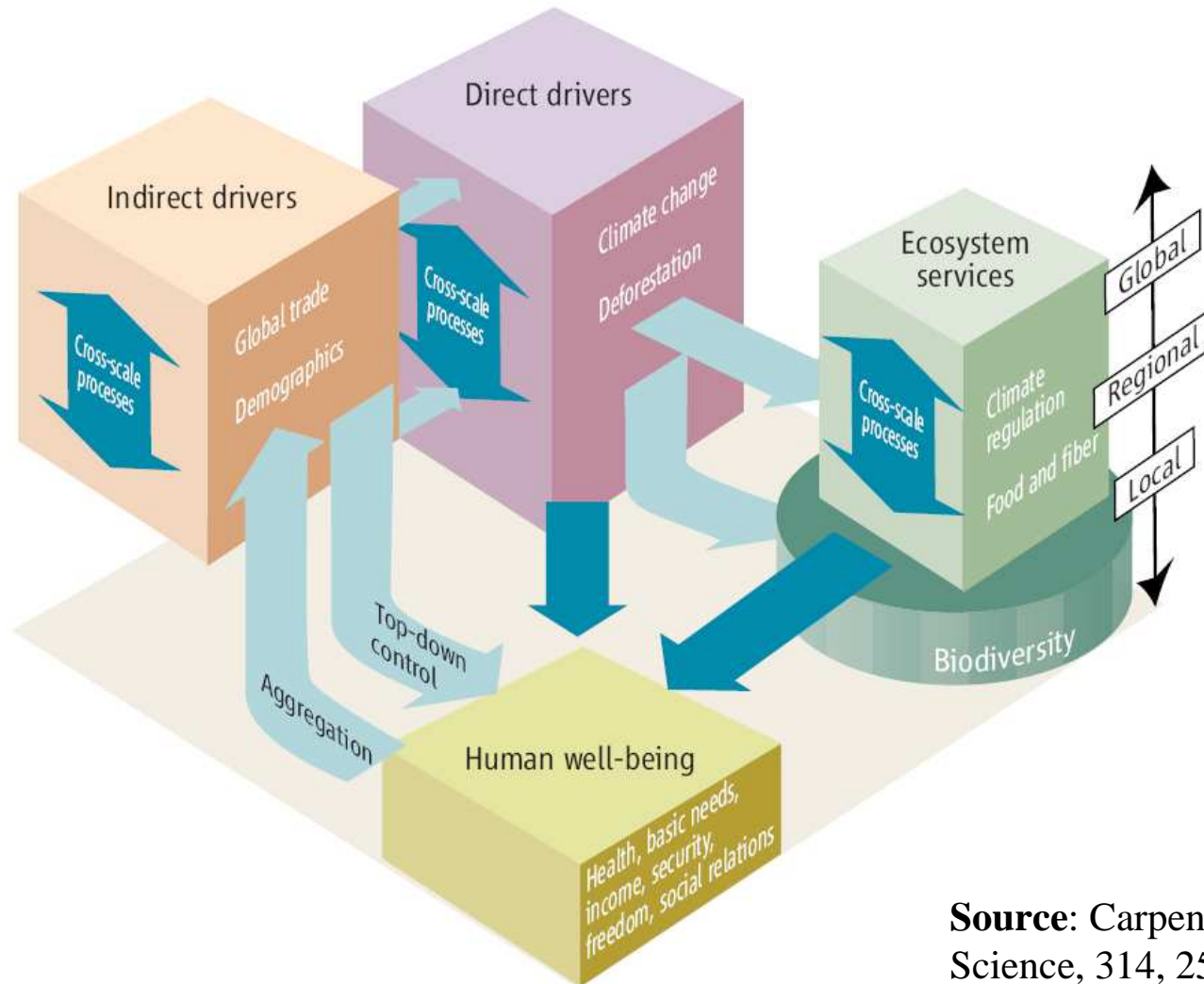
RUBICODE research themes

1. Frameworks and concepts for the assessment of ecosystem services in terrestrial and freshwater ecosystems.
2. Approaches for linking ecosystem service provision to functional traits.
3. Indicators for monitoring ecosystem services.
4. Socio-economic and environmental drivers of biodiversity change.
5. Strategies for conserving and managing biodiversity and the services it provides that take account of drivers of biodiversity change.
6. Identification of current gaps in knowledge and future research needs.

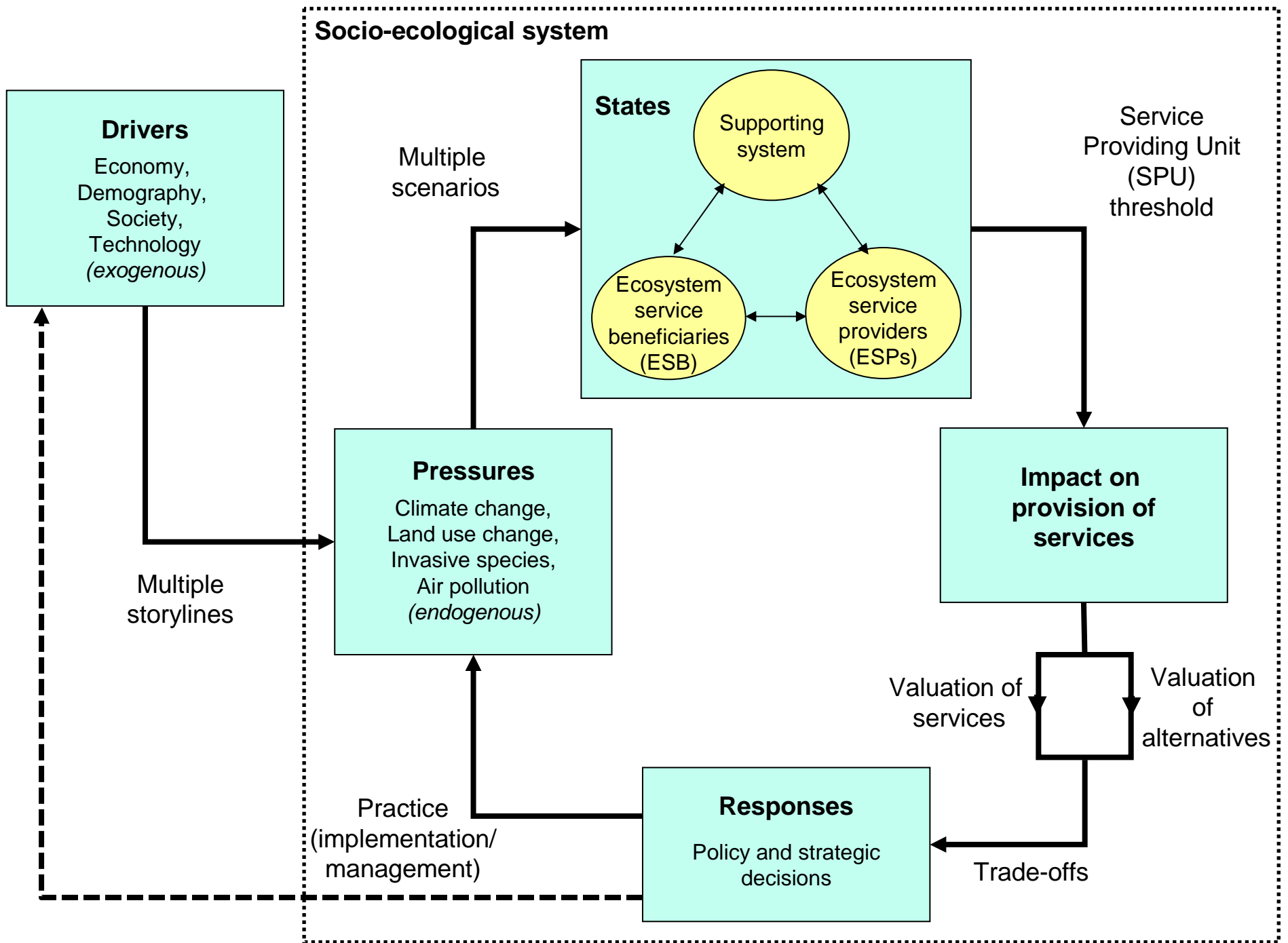


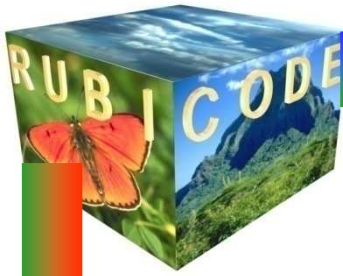


MA conceptual framework



Source: Carpenter et al. (2006).
Science, 314, 257-258.





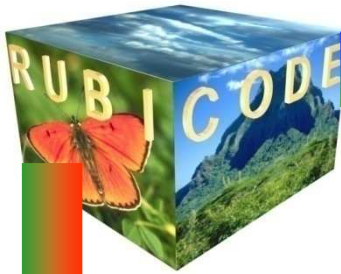
Service-providing unit (SPU)



“The collection of organisms and their characteristics necessary to deliver a given ecosystem service at the level required by service beneficiaries.”

Need to know:

- The sections of society that need/use the service (Ecosystem Service Beneficiaries - ESBs).
- The level at which it is required.
- The organisms that provide the service (Ecosystem Service Providers – ESPs).
- The characteristics of these organisms required to provide the service at the desired level (SPU).



1. IDENTIFICATION

Define the ecosystem service:

- identify the ecosystem service beneficiaries
- identify the spatio-temporal scale of service delivery
- identify the ecosystem service providers (ESPs)

2. QUANTIFICATION

Quantify the ecosystem service demand:

- determine the net level of demand/need for the service

Quantify the service-providing unit (SPU):

- determine the characteristics of organisms necessary for service provision
- quantify the relationships between SPUs and service supply
- quantify the components of biodiversity that support the SPU

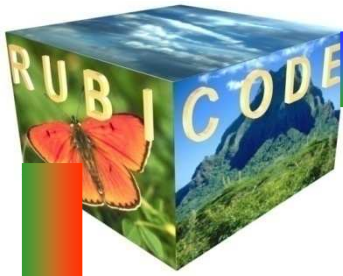
3. APPRAISAL

Value the service as provided by the SPU

Identify and value potential alternatives for providing the service

Evaluate options:

- compare valuations and examine trade-offs
- determine implications for biodiversity conservation
- determine implications for policy and sustainable livelihoods



Seed dispersal in urban park

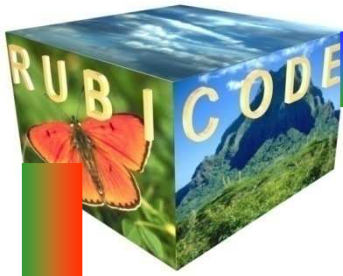


Need defined by:

- Cultural, recreational and biodiversity 'value' of park.
- Eurasian Jay primary facilitator of acorn germination.
- Estimate replacement cost of seed dispersal service.

SPU =

A minimum of 12 resident pairs of Eurasian Jay present each year for 14 years.



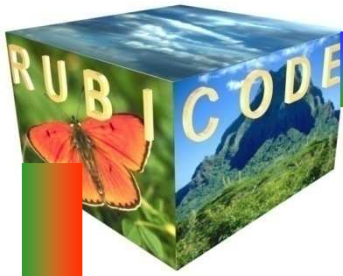
Pollination of watermelon

- Up to 30 native bees pollinate watermelon.
- Contribution to pollination varies across years and within and among crops.
- Diversity of native bee community essential as the most functionally important species can vary across time and space.



SPU =

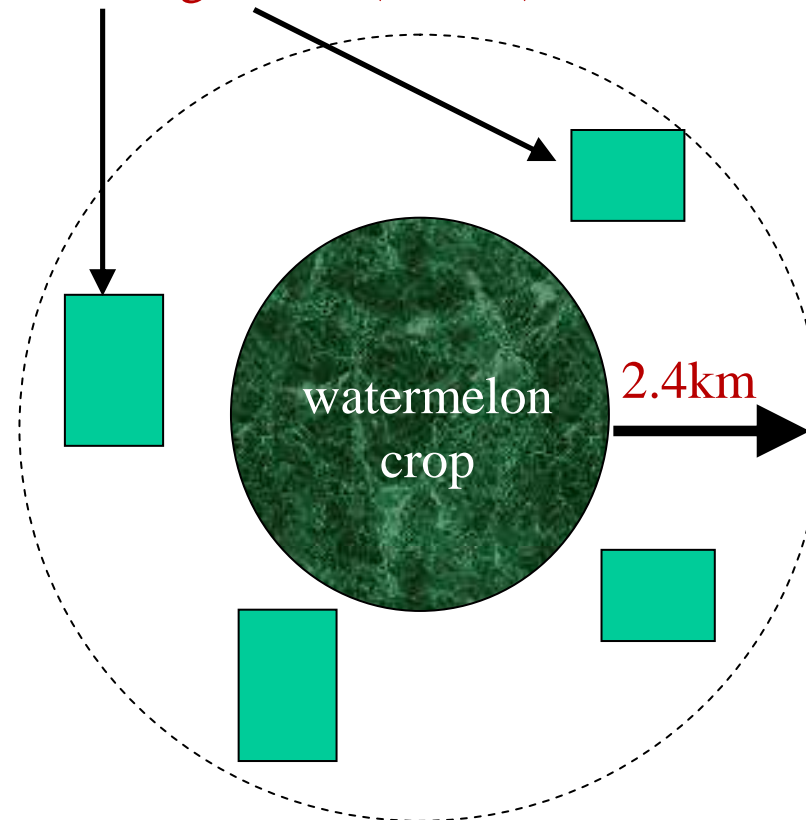
The composition of the functional group, the functional traits of each member, the population characteristics of each member, and appropriate spatial and temporal dynamics to deliver the service at the desired level.

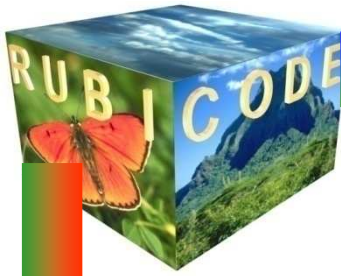


Pollination of watermelon

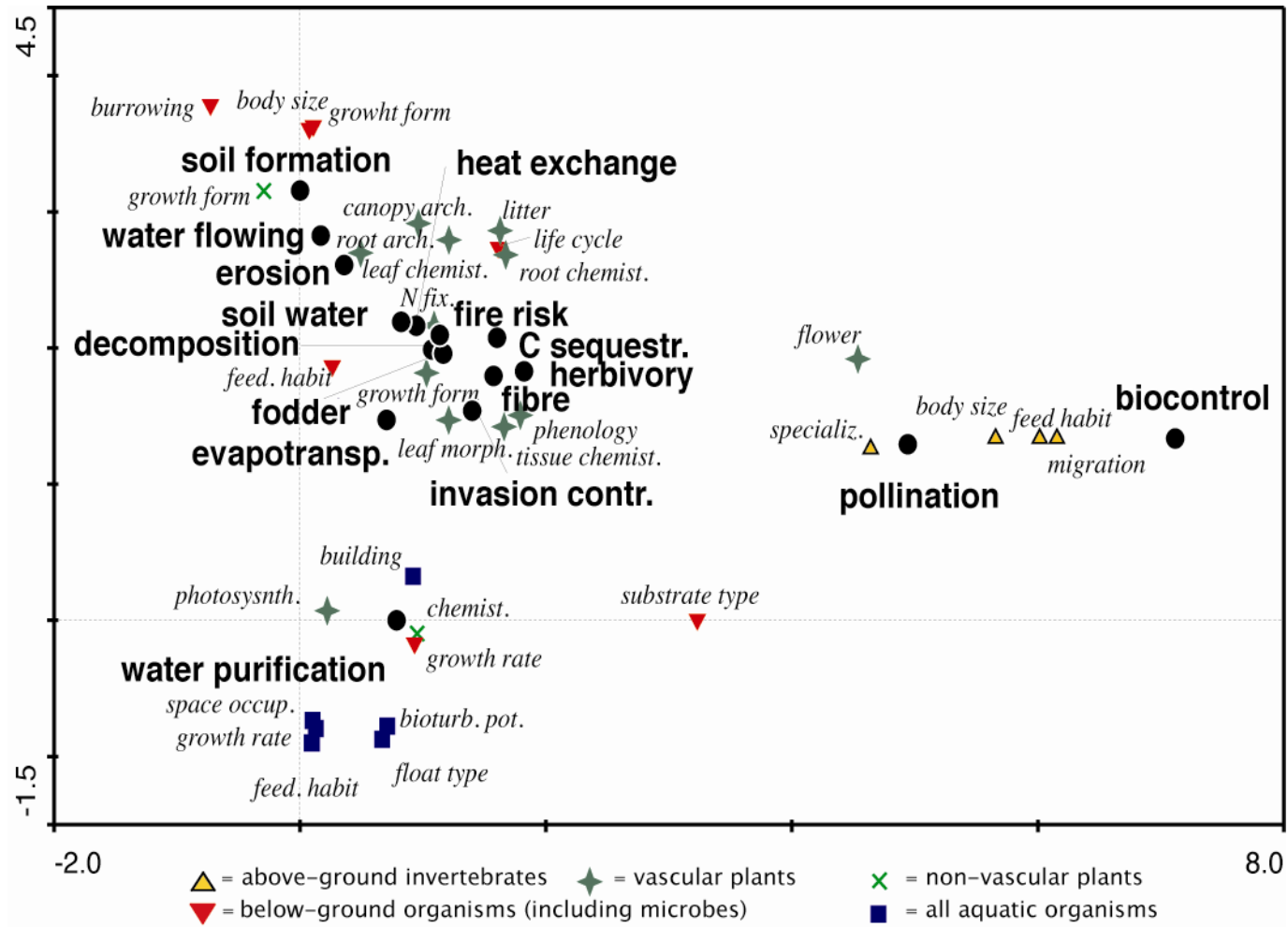
Manage service delivery by protecting habitat that supports native bees.
About 40% cover within 2.4km should provide entire pollination service.

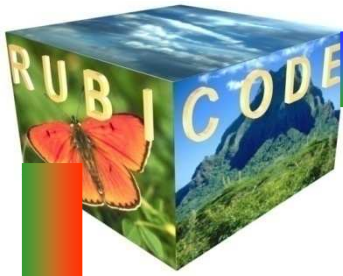
Native vegetation (~ 40%)





Linking traits to ecosystem services

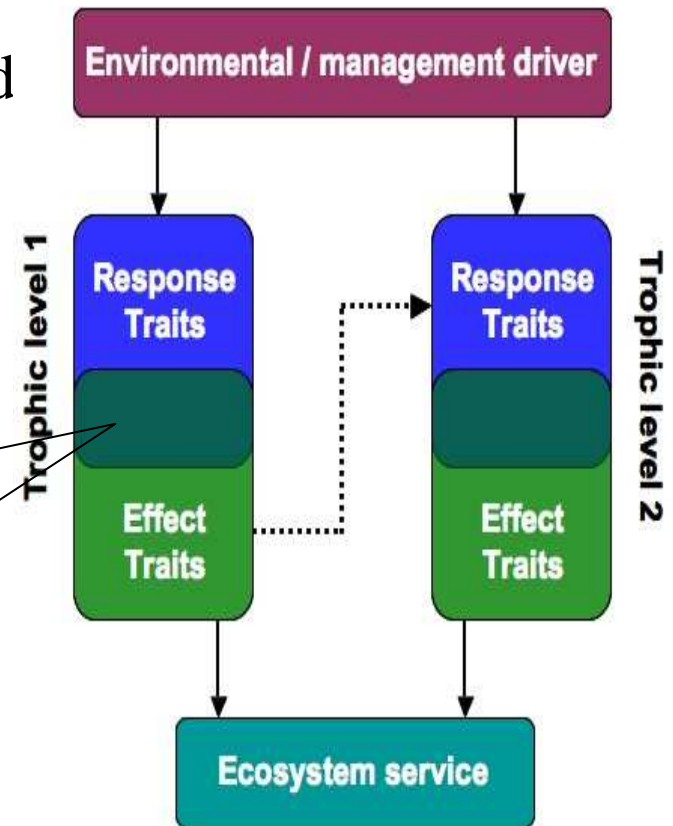


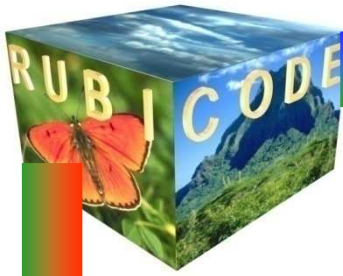


Trait cascade framework

1. Identification of key traits as predictors of ecosystem service delivery levels.
2. Identification and quantification of the links between response and effect traits.
3. Identification and quantification of the links between traits across trophic levels.

Is there any overlap or correlation between response and effect trait (in either trophic level)?





RUBICODE outputs

- (i) A series of review papers (drivers, frameworks and concepts for ecosystem service assessment, valuation, indicators, traits and conservation strategies). **Completed.**
- (ii) Workshops to evaluate the concepts and methods and identify gaps in knowledge. **4 completed; 1 ongoing.**
- (iii) A series of strategy papers that will synthesize knowledge from (i) and (ii), and suggest priorities for future research. **Ongoing.**
- (iv) Roadmap of future research needs. **Ongoing.**