

# Concept of a framework to define economic and social costs and benefits of regenerative farming systems

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## Motivation

- Regenerative Agriculture (RA) intends to improve ecological function by elevating soil health and achieving desired and beneficial outcomes in agriculture. Despite a large number of examples and application of regenerative and conservation agricultural practices, there is still lack of certainty in empirical data to quantify the effect of regenerative agriculture. Further, there is no framework to model the linkages of RA's economic, environmental and social benefits of regenerative agriculture.
- Our intent is to link those principles contributing to the structure of a framework and distinguish long-term societal goals against individual short-term goals. The framework is based on the incorporation of natural capital and farmer well-being into resource and land use decisions and their linkages will be modelled using known ecosystem services modelling techniques.
- The pathway to be explored will require the design of models that take into account economic and financial risks inherent to agriculture and combine them with framework(s) that capture aspects of natural, human and social capital, and ecosystem services that are currently poorly represented in agricultural decision support tools. Representative biophysical parameters will be presented as comparative and quantifiable indicators for the anticipated increase in soil health as a consequence of the transition to or already practised RA.

## What is Regenerative Agriculture?

A range of definitions are floated in literature and the majority of views circle around the need to develop integrated food production systems, which improve soil health, enhance environmental quality, integrate natural cycles and biological controls, integrate farmer's well-being and resilience with ecological well-being and resilience and extend it to communities, minimises the use of non-renewable resources. There is a strong overlap with production systems labelled as sustainable agriculture, (agro-)ecological farming, organic agriculture and more. While their intentions are often similar and overlapping there are also differences.

A word cloud analysis of 225 publications published over the past 10 years on RA revealed that the primary focus is on ecosystem services and biophysical parameters and definitions (Figure 1).



Figure 1

## Development of a Framework

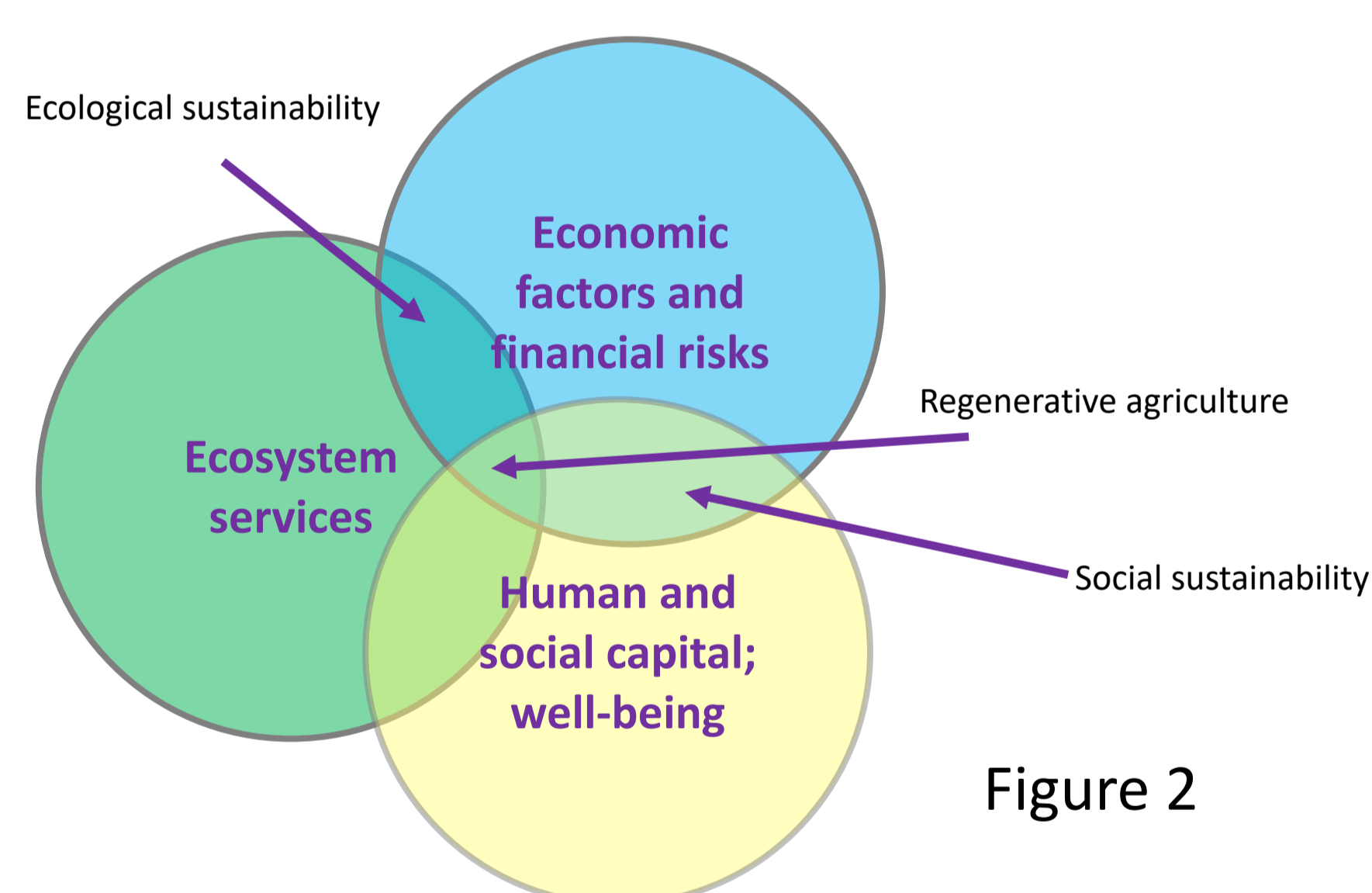


Figure 2

The basic concept of modelling an integrative approach will build on existing models connecting ecosystem services with economic factors and human and social capital. As a base line such a model is can be illustrated using the triple bottom line concept (Figure 2).

An attempt to link ecosystem services with well-being components has been attempted in the Millennium Assessment (Figure 3). A challenge will be to integrate directly non-measurable well-being components into a model.

Many key practices in RA like reducing tillage, maintaining soil cover, improving soil health by building a carbon pool, elevate biodiversity and microbial activity, reduction of use of synthetic fertiliser, integration of livestock and improvement of soil structure to increase water infiltration and reduce the risk of erosion have established methods for quantification and can be linked to a metric value.

However, the rebuilding of an aspired agricultural production system from a degraded starting point, will have to be recognised as a non-linear process (Figure 4) and will reach an optimum over time by applying RA principles. The success of the implementation will be affected by the variability in natural resources influencing farming but also other risks related to global economical influences.

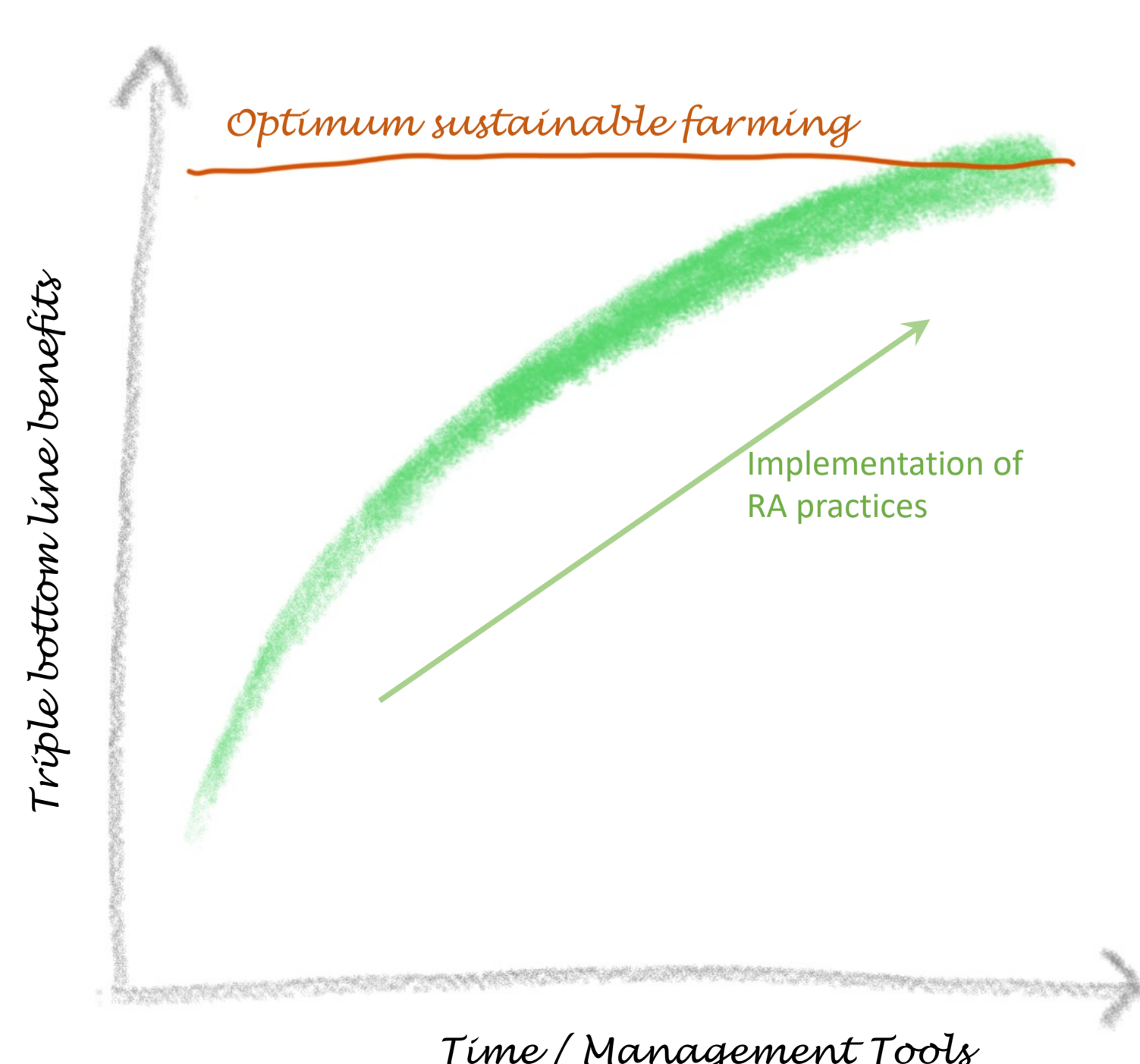
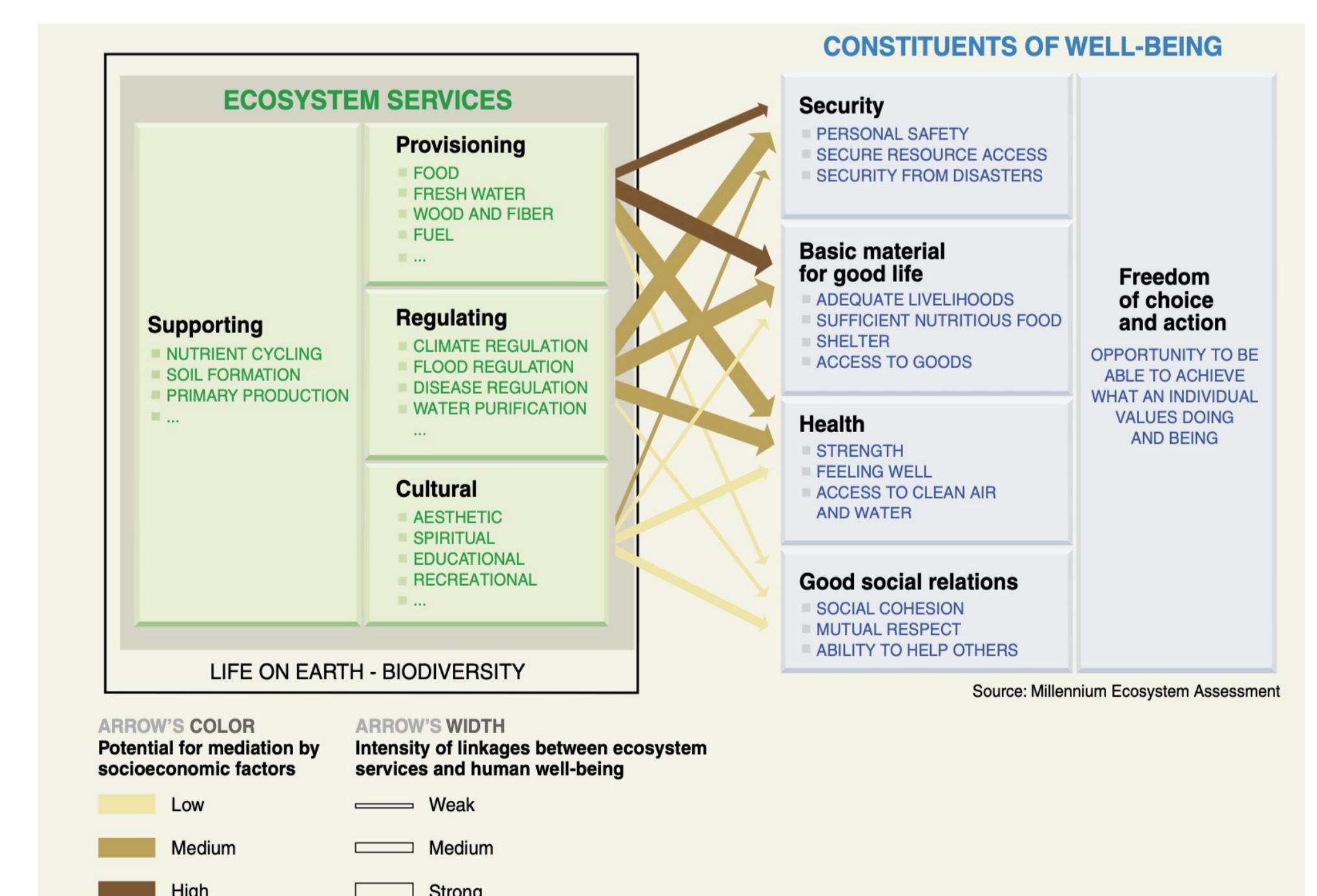


Figure 4

Other parameters defining the value and benefit of RA like the contribution to community and social capital; aesthetic values; appreciation of life style or farmer health and well-being are difficult to quantify as a distinct set of parameters. Bayesian belief networks may play an important role for their integration into the framework.

## References:

Alternatives Journal; Waterloo Vol. 25, Iss. 4, (Fall 1999): 42-43. Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-being: Synthesis. Island Press, Washington, DC.



From: Millennium Ecosystem Assessment (2005) Figure 3