# 7.5. Business and industry

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## Introduction

The private sector has strong relationships with ecosystem services (ES). Business and industries receive benefits from ES but they can also have major impacts on ecosystems and ES delivery. ES degradation can have a significant impact on a company's performance in sectors such as food production, construction, hydropower, tourism or biotechnology.

There are very few examples of ES accounting used to support business management and decision-making. It is uncommon for firms to make the link between ecosystem management and financial performance and there is a general lack of understanding of the extent of firms' dependence and impact on ecosystems. In some cases the exclusion is due more to a lack of guidance on how a company conducts such an analysis than to a lack of knowledge.

A further complication is the public-good nature of ES and the absence of markets for many ES. As a consequence, many ES benefits/impacts are not represented in market prices. Land-use decisions by the private sector tend to maximise only single objectives which may lead to a decline in other ES.

There are several arguments for ES consideration in company decision-making, particularly given the strong interactions between industry and ES and increasing consumer awareness of the contribution of ecosystems to well-being. Table 1 lists advantages of accounting for ES in business decisions.

In this chapter we show how the inclusion of ES in business decision-making can improve company management and performance. We also show how ES mapping leads to more optimal land management decisions. We then highlight particular challenges faced in mapping ES in the private sector and we present some examples from existing applications and case studies.

**Table 1.** Potential advantages and disadvantages in accounting for ES in business and industry.

| **Potential advantages** | | **Potential disadvantages** |
|---|---|---|
| **Greening the company's image** | **Improving ES management** | **Adaptation to novel techniques** |
| Respond to consumer demand for green products<br>Produce life cycle assessment or environmental impact assessment accounting for ES<br>Consideration by different investors and for bank loans grants<br>Helps in demonstrating corporate sustainability. | Determining more cost-effective investments<br>Identifying new opportunities/risks<br>Answer to legal regulations and eventually reduce taxes or become eligible for other financial incentives<br>Develop leadership in considering ES<br>New complementary tool for project design, enhancing project acceptability by strengthening existing approaches. | - Cost and time consuming<br>- Adaptation of ES analysis to existing tools<br>- Availability of data<br>- Uncertainty on the results<br>- May need the collaboration with research partners<br>- May reveal commercially sensitive information. |

## ES mapping for business and industry

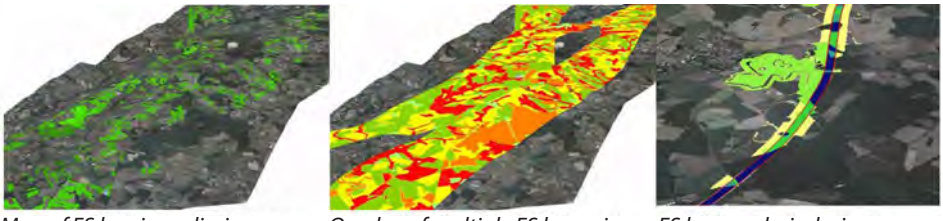
By providing spatially explicit descriptions of ES, mapping can be used to evaluate business opportunities and to reduce risks for companies whose operations rely on natural resources and ES.

Mapping ES can improve decision support and evaluation tools commonly used in the private sector, such as environmental impact assessments (Box 1), lifecycle assessments, risk assessments, cost-benefit analyses (Box 2), land-use plans, or off-site mitigation plans. Maps can be used to assess the impacts of alternative business decisions or courses of action on the location, quantity and value of ES. A company can also use ES maps to assess the direct, indirect and cumulative impact of their operations on ES, as well as how activities from other industries affect their operations and profits.

Modelling and mapping ES supply, in both biophysical and monetary terms, assists private sector decision-makers to locate ES delivery hotspots or cold-spots. These types of maps allow a company to identify and then take advantage of ES benefits. By modelling scenarios of change, land use alternatives and the synergies and trade-offs between delivery of ES can be assessed in order to enhance the provision or the use of multiple ES. Maps and modelled ES scenarios are useful for monitoring consequences of different business investment strategies, improving resource management and/or determining and locating new opportunities for business investment (e.g. identifying best locations to offset carbon emissions or offset biodiversity impacts from infrastructure developments). Mapping can help reduce risks for companies

### Box 1. Mapping ES for a transport infrastructure construction project in France

ES maps have been used to assess ES loss caused by infrastructure construction in order to account for it in the project evaluation tools. The analysis proved to be a powerful complementary means of comparing implementation options at different stages of environmental impact assessment (see Figure 1). It allows for the consideration of impacts otherwise overlooked, but also better targeting of mitigating measures. Further, since ES loss is expressed in monetary terms, the loss induced by the final selected route can be integrated as a standard social cost in the cost-benefit analysis, allowing a more efficient control of natural capital loss.



*Map of ES loss in preliminary studies (local climate change regulation service here)*

*Overlay of multiple ES losses in preliminary studies*

*ES loss analysis during implementation option comparison*

**Figure 1.** ES mapping for infrastructure construction projects (Source: Egis, AULNES ©, based on Tardieu et al. 2015).

that depend on ES (e.g. mapping flood damage risks for the construction sector).

Mapping ES supply can identify potential foregone benefits (opportunity costs) incurred by a business decision (e.g. foregone agricultural production). Opportunity cost maps can be used to spatially target locations for investment which are most cost effective (i.e. provide greatest returns for least cost). Locations of comparative advantage in ES supply can be identified and investment decisions can be made based on whether it is better to jointly generate multiple ES in a region or to specialise in one ES. This will help companies manage trade-offs in operations, investments and management.

Mapping ES values derived from beneficiaries (in monetary or non-monetary terms), such as through a participatory GIS process (Chapter 5.6.2), can be used to identify areas with ES benefits specific to economic sectors (e.g. tourism sector). By assessing and mapping the variation of these benefits according to different land uses, companies can estimate losses or gains from their operations (See Box 2 for an illustration) and they can target cost-effective risk adaptation or mitigation measures (e.g. determining where to implement a fauna passageway at a new road infrastructure development). Table 2 lists examples of the use of ES maps in business.

## Particular challenges in ES mapping for business and industry

Spatially-explicit ES valuation is not simple. The process requires multi-disciplinary expertise: environmental and ecological science, geographic information systems and socio-economics. However there are tools that companies can access to help map ES such as InVEST[1] (Chapter 4.4), but these tools can be difficult to implement or adapt to private sector activities. Partnerships between companies and researchers are becoming more common for developing brand-friendly toolkits (e.g. AULNES[2]©, EarthGenome[3]) or platforms for advice, tools and techniques (e.g. Oppla[4]). A growing number of initiatives to help the private sector in realising ES benefits are available, such as the Corporate Ecosystem Services Review Guidelines.

### Box 2. Lafarge example in the Presque Isle quarry, Michigan (Natural Capital Project, WRI and WWF)

Lafarge is one of the largest construction materials companies in the world. InVEST was used to map and value two ES relevant to Lafarge's operations on quarry sites: erosion control and water purification. ES mapping located areas where vegetation contributes to sediment retention and evaluated the monetary value of the service provided by avoiding dredging costs. It also identified areas where vegetation could be grown to reduce potential sedimentation of Lake Huron. The assessment of the water purification service by calculating the amount of nitrogen retained by the site has also been analysed. Subsequent economic valuation showed that Lafarge's efforts to maintain vegetation provided a clear benefit by avoiding water treatment costs.

Case study available at: http://www.wri.org/sites/default/files/esrcasestudylafarge.pdf

[1] http://www.naturalcapitalproject.org/invest/

[2] http://www.climatesolutionsplatform.org/solution/aulnes

[3] http://www.earthgenome.org/

[4] http://oppla.eu/

**Table 2.** Example of ES maps of practical business relevance in different sectors.

| Business sector | Example of ES assessment and mapping potentially useful for the sector |
|---|---|
| Forestry | Mapping wood production for forest profitability versus provision of other ES (global climate regulation, recreation, regulation of water flows) to identify areas with comparative advantages |
| Agriculture | Mapping pollinators probability of presence and increase potential crop yields and revenues |
| Aquaculture | Assess and map different farming practices, location of farms in relation to climate change to determine how it affects harvests |
| Water treatment by beverage producers | Map pesticide diffusion and water purification performed by wetlands to minimise contamination of watersheds and identify how to manage upstream land sustainably |
| Hydropower companies | Map avoided erosion to identify land areas upstream that are important for erosion control and reduce the costs of removing sediment from reservoirs |
| Transportation | Map impacts on ES of alternative routes and identify best location for mitigation measures to increase probability of project approval |
| Tourism | Identifying risky areas to avoid when locating businesses or identify areas with particular recreational benefits |

The major challenges can be classified into methodological and operational. The main methodological challenges are: i) defining and prioritising ES; ii) determining the type of impact of operations on ES; iii) modelling and mapping multiple ES in large areas and iv) dealing with the future (e.g. temporal trends, discount rate, evolution of ES prices). The main operational challenges are: i) the integration in existing evaluation tools; ii) the cost, time and resources required for such analysis; iii) the need for exhaustive assessments and precision of data for trade-offs and iv) the balance between scientific reliability and reproducibility. Note: Tardieu (2016) (reference below) should be consulted for explanation of these major challenges.

## Further reading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