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# Ecological footprint of an organization: can it really be measured?

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## Introduction

Ecological footprint aims to compare the demand on ecological services to the available supply. Such a metric is needed to make policy makers understand the threat of overshoot of natural resources and to facilitate the emergence of a consensus over the actions that are needed to address the ecological risks. During the 2000's, the Global Footprint Network has endeavored to develop and mature the methodology of the National Footprint Accounts [1]. This metric attends to assess current ecological supply and demand, at a macro-economic scale.

The aim of this paper is to question whether applying such a metric at a micro-economic scale is possible and relevant. Which method can be used to estimate the ecological footprint of an organization? Does this estimation make it possible to set goals of improvement, to identify options for action, and to track progress toward these goals? Which are the limits of such an exercise?

The method, that will be presented, has been developed and validated for the Vanoise National Park, in the Alps, France. This public organization is in charge of preserving the territory of the Vanoise, getting knowledge about its natural and cultural patrimony and making the public aware about the necessity to protect it.

## Methods

Ecological Footprint aims to evaluate the human appropriation of ecosystem products and services in terms of the amount of bioproductive land and sea area needed to supply these services. Its unity is the "global hectare" (gha) defined as a hectare that has the world average productivity of biologically productive land and water in a given year. The area of land or sea that is biologically productive is called biocapacity. It represents the biosphere's ability to meet human demand for biological resources' consumption and CO<sub>2</sub> sequestration. The Ecological Footprint and biocapacity accounts cover six land use types: cropland, grazing land, fishing ground, forest land, built-up land and carbon uptake land. For each component, the ecological footprint is obtained through the consumption of a harvested product (or amount of emission of CO<sub>2</sub>) divided by the yield for this ecological services. This value is then converted into "global hectares" thanks to yield and equivalence factors [2].

The same principles were considered to estimate the ecological footprint of an organization. The following approach was followed:

- The first step was to **define the scope of the activity** under study [3].
- The second step requires **collecting the consumption data of the organization**. Five categories of components were considered: infrastructure, mobility, food, manufactured goods that are used for the activities and communication of the public institution (consumables and depreciation), services.

- The third step consists in **organizing the information and calculating the conversion factors** into global hectares. When possible, information sources must be consistent with the information sources of the Global Footprint Network (for example, FAO for harvested products). Concerning the carbon emission factors, the "Bilan Carbone<sup>®</sup>", which has been developed by the French national energy agency, ADEME [4], was used in order to make the Carbon footprint be consistent with the results of the more official "Bilan Carbone<sup>®</sup>". However, it takes into account 6 greenhouse gases contrary to the GFN method that only considers CO<sub>2</sub> emissions.
- The fourth step is to **calculate the ecological footprint** of the organization and to verify the results by cross-checking.
- The fifth step is the **synthesis and interpretation of the results** in order to identify the components that have the most important contribution to the ecological footprint.

### Results and Discussion

The main results obtained by this estimation will be described. For instance, the ecological footprint of the administration of the Vanoise National park was estimated to 189 gha (or 2.52 gha / employee) in 2007 and 148 gha (or 1.70 gha / employee) in 2008. But are such figures easily understandable and interpretable? To what extent can they be compared to national biocapacity results? Which are the conceptual and methodological limits of this exercise ?

For example, the Vanoise National Park has committed to reduce its ecological footprint by 3 percent each year. In order to track progress toward this goal, it wants to measure yearly its ecological footprint. This poses methodological difficulty. Indeed, rigorously, when calculating the ecological footprint of a new year, conversion factors should be updated to take into account the annual yields. In this case, the variations of ecological footprint could be explained by changes in the consumptions of the organization and / or changes into conversion factors. The latter are linked to variations of national or even world-wide productivity. With an environmental management point of view, this is not satisfying. Indeed, the aim of the organization is to track only changes that it is responsible for and that are linked with its own consumptions. Then, the choice was made keep the same conversion factors every year.

### Conclusion

Although the exercise of calculating ecological footprint for an organization raises several methodological and conceptual questions, it also has some interests as an indicator for an environmental management system. For example, it obliges to implement an information system based on physical data and not only monetary data and it make it possible to identify goals of improvement and to track progress toward these goals.

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