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# Toward a reliable assessment of the environmental sustainability of territories

**Implementation of the ESGAP indicator to assess the condition and the sustainability of environmental functions in New Caledonia**

The Environmental Sustainability Gap (ESGAP) is an innovative tool for assessing the condition of a territory's environmental functions and how sustainable they are. Despite the sparse and fragmented nature of usable environmental data, a pilot study that used ESGAP in New Caledonia has revealed the poor capacity of the ecosystem to neutralize pollutions and the relatively sustainable supply of resources, and capacity to sustain biodiversity and human health. The use of ESGAP makes it possible to suggest improvements in the management of natural capital at the territorial level by highlighting sustainability gaps.

## I. A strong sustainability indicator to measure the state of natural capital

Stakeholders responsible for implementing public policies for development and environmental protection need to monitor the state of the environment in order to assess the effectiveness of their actions, prioritize policies and management measures, and thus create an objective basis for their contribution to the conservation of natural capital. In the context of the collapse of living systems, marked by alarming climate change and widespread overexploitation of natural resources, these stakeholders must be able to rely on scientific standards that allow them to define from which point environmental functions can be considered sustainable (Andersen et al., 2020). They must also be able to rely on tools that are compatible with the principle of strong sustainability, i.e., that adopt demanding criteria regarding the non-substitutability of natural capital by other forms of capital (in particular manufactured capital) at territory or country level. Many ecological processes are indeed governed by non-linear dynamics, with sustainability thresholds that are sometimes poorly understood. Therefore, monitoring and assessment frameworks must reflect the reality of ecological processes as closely as possible if they are to be relevant.

Few monitoring and environmental management tools are specifically dedicated to measuring the condition of essential

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and critical contributions of natural capital. Moreover, no tool adequately meets the minimum specifications for an environmental sustainability assessment that adheres to the principle of strong sustainability. These minimum specifications would be:

1. To objectively describe the condition of environmental processes deemed essential and critical, based on biophysical data;
2. To be based on scientifically established norms and standards of "good ecological condition" in order to be able to assess the differences in sustainability while excluding any form of substitution by other types of capital;
3. To use high-quality data that are appropriate to the ecological processes being measured, the socio-political context, and the levels at which decisions will be made, while taking into account the challenges associated with decision-making.

With regard to the first criterion under these specifications, the Sustainable Development Goals (SDGs) are often used as a reference and analysis framework, though they contain precious little that is related to the environment (United Nations Environment Programme (UNEP) 2021). Another benchmark measure, the highly publicized "Ecological Footprint" (EF) from the Global Footprint Network, focuses on six factors that have a strong territorial impact. Consequently, the EF allows for very precise, operational measurements, but it does not cover all the critical issues that may arise in a country, and it is not based on an objective description of the dynamics of environmental functions. Another framework that is often favored —the "planetary boundaries" identified by the Stockholm Resilience Center— directly addresses this first criterion by providing a complete and objective description of the state of the environment. However, it fails to meet the third criterion. While this framework defines essential and critical ecological processes on a global scale (Steffen et al. 2015), the boundaries do not operate at the national or territorial level.

The second criterion under the specifications —the use of environmental sustainability standards— also appears too infrequently or inadequately under existing approaches. An operational sustainability standard combines a sound scientific knowledge of the ecological trends at work with a political appreciation of what is at stake in societal terms. A sustainability standard makes it possible to make objective, collective choices about the acceptable level of risk to the proper working of essential and critical environmental functions, in line with the Paris Agreement's objective to limit global warming to 2°C and preferably 1.5°C. By measuring the deviation from this standard, it will be possible to account for both the direction and the distance that still needs to be covered in order to reach a "good ecological condition." Most approaches make do with surrogate indicators and standards that are far removed from an objective description of the state of environmental functions. The SDGs and the Yale Environmental Performance Index both notably include indicators and targets for the implementation of means and responses designed to achieve sustainability.

The Environmental Sustainability Gap (ESGAP) indicator developed by Paul Ekins's team (Ekins et al. 2019) at University College London is the first initiative to directly address these specifications for assessing the condition of the environment from a strong sustainability perspective (see Box 1). The first pilot project to implement the ESGAP indicator was conducted in New Caledonia. Thanks to the project, some initial lessons were drawn on managing the territory of New Caledonia and applying ESGAP in other areas in the future[1].

## II. Results from the ESGAP pilot in New Caledonia

### New Caledonia still has still some way to go to achieve environmental sustainability

ESGAP calculations in New Caledonia reveal the poor condition of the capacity of the ecosystem to neutralize pollutions (10%), primarily because of high greenhouse gas emissions and the impact of forest fires on the ecosystems. The other ESGAP components are in a relatively sustainable condition. It is the "biodiversity" component that has the most sustainable status (73%), followed by the "source" component (68%), then "Human health and welfare" (67%) and finally "sink." Aggregating these four functions gives an overall SES score of 43% (see Table 1 and Box 1).

Of the 7 of the 23 indicators that were reported on for the SESP in New Caledonia, two are in line with the sustainability standard and remain so over time. This is the case for fisheries resources —the Pacific Community has, for several years now, regarded tuna fishing in the western and central Pacific as sustainable— and for outdoor air quality, which has not exceeded the thresholds for fine particulate matter (PM10, PM2.5) for several years. On the other hand, the state of marine ecosystems is not in line with the target status of "good ecological condition." It is on a positive trajectory, but not enough to be environmentally sustainable by 2030. Another component, the UNESCO heritage status, is far from the standard and not progressing. It is rated "good with some concerns." Finally, three components —greenhouse gas emissions, surface area burned, and bathing water quality— have trajectories that are moving away from the standard of good condition.

## Box 1 – The ESGAP framework measures ecological status and trends

The ESGAP framework is based on a scorecard that provides information on changes in the condition of 23 environmental indicators, with a focus on gaps between these changes and the goals of maintaining or achieving a "good ecological condition." These indicators cover the four main categories of critical contributions from natural capital: the provision of resources, the removal of pollution, biodiversity, and human health. The 23 indicators are aggregated into a single measure, the Strong Environmental Sustainability Index (SES), and an progress indicator, the SES Progress (SESP). The SESP index compares the trends for each indicator with the trajectory for reaching the sustainability standard.

[1] Project supported by the AFD, WWF France, and the MAVA Foundation, and conducted by the Ecological Accounting Chair at AgroParisTech. For the full final report, see Comte et al. (2021).

Table 1 - The condition of environmental functions in New Caledonia

| | | Ecological condition | Trend |
|---|---|---|---|
| Source | Forest resources | 100% | |
| | Fish resources | 100% | On track to meet the target |
| | Surface water resources | 61% | |
| | Groundwater resources | | |
| | Soil erosion | 59% | |
| Sink | Greenhouse gases | 5% | Moving away from target |
| | Ozone depleting substances | | |
| | Ozone pollution | | |
| | Pollution by heavy metals | | |
| | Acidification | | |
| | Eutrophication | | |
| | Forest fire pollution | 19% | Moving away from target |
| | Surface water pollution | 24% | |
| | Groundwater pollution | | |
| | Marine pollution | | |
| Life-support | Terrestrial ecosystems | 71% | |
| | Freshwater ecosystems | | |
| | Marine ecosystems | 75% | Progress towards target, but at an insufficient rate |
| Human healthand welfare | Indoor air quality | | |
| | Outdoor air quality | 100% | On track to meet the target |
| | Drinking water quality | 62% | |
| | Bathing water quality | 44% | Moving away from target |
| | UNESCO Heritage | 75% | No significant overall progress |

The table shows the deviation from the "good ecological condition" standard for each indicator. Where possible, the trajectory of change in relation to this standard is also calculated. Each function varies from 0 (very degraded condition) to 100 (achieved sustainability standard). Information was available on only 13 out of 23 components.

The capacity of the ecosystem to neutralize pollutions is in poor condition, while the source, biodiversity, and human health components are in relatively sustainable condition.

Missing data are represented by blanks in the graph.

### Significant work is still needed to define sustainability standards

The starting framework for ESGAP was designed in the European context, where data is readily available. However, while environmental goals are referred to in a good number of legislative documents, standards, and scientific studies in Europe, this is not the case in a territory such as New Caledonia. There are already some existing standards for functions related to human health and wellbeing, such as bathing water quality and the status of UNESCO properties, but this is not the case for resource use, pollution, or biodiversity. Moreover, some goals require adaptation because the way they are defined for a European setting is not suited to New Caledonia. This is the case for the goal regarding soil erosion, for instance, which uses a threshold that has been adapted to European climate and geology and not to the situation in New Caledonia.

International standards based on scientific recommendations have been used for some indicators, such as the sustainable use of fish resources or outdoor air quality. In other cases, standards are being developed in New Caledonia, such as for metal pollution in aquatic ecosystems. Other goals are not yet available, such as the goal of "good ecological condition" for freshwater ecosystems. Finally, several goals for terrestrial biodiversity levels and greenhouse gases are still being debated by decision-makers at all levels, so a consensus still seems out of reach.

## III. What ESGAP can do to support environmental management in developing countries

### The implementation of ESGAP highlights a critical lack of data on the state of the environment

Concerted efforts on international frameworks can improve the quality and availability of environmental data in developing countries and territories. The situation in New Caledonia is fairly representative of that in many other countries. Of the 23 indicators that were initially included in the ESGAP method, information was only available on 12

and only 5 could have been populated with data from international databases. This work highlights the lack of reliable data that can be used for the institutional monitoring of ecological functions and environmental policies, as well as the weakness of existing standards.

Efforts are being made to improve the potential of the SDGs for carrying out sustainability diagnostics. However, as has been pointed out in an analytical report by the UNEP (2021), the SDG framework has a long way to go. Indeed, among the 247 indicators officially present in the framework, only 11 actually document the condition of the environment, and of these, only a minority include a scientific standard as the ESGAP does. This work on the SDG framework, as well as on the post-2020 accountability framework for the forthcoming Convention on Biological Diversity, is essential to guiding future efforts to build the capacity of statistical institutions and to establish standards on environmental monitoring and diagnostics (*Nature*, 2021).

### Consultations reveal a lack of regulations that have clear goals and timelines

New Caledonia has no regulations on biodiversity maintenance, certain aspects of pollution treatment, or on the sustainable use of natural resources such as soil and forests. There are several regulations and standards on aspects of environmental health such as air and water quality. Existing public policies cover only water management —the Politique de l'Eau Partagée de la Nouvelle Calédonie (PEP) (the New Caledonia Shared Water Policy)— and energy/climate—the Schéma pour la Transition Energétique de la Nouvelle-Calédonie (STENC) (Energy-Transition Plan).

This observation shows the importance of translating the attainment of good ecological condition into law and public policy in developing countries. The international standards, regulations, and treaties that cover the environmental functions of ESGAP provide an initial basis for responding to this challenge (Fairbrass et *al.*), which will need to be pursued in developing countries in order to take into account the specifics of their environment and institutional frameworks.

### The ESGAP framework can still be used as a good summary of the state of natural capital

ESGAP can be used for environmental management, even with a partial set of indicators. The ESGAP scorecard provides a high-level overview of the preservation of natural capital—an overview that was lacking in New Caledonia. As in many other countries and territories, New Caledonia suffers from the considerable fragmentation of environmental monitoring and environmental goals. This is connected to the large number of stakeholders involved, whose goals are not always aligned, and by the different levels of governance concerned.

This ESGAP pilot has made it possible to identify all the stakeholders involved in environmental monitoring and management at all levels in the territory. The pilot has helped to point the way forward in helping integrate the issues of pollution control, the protection of ecosystems and, more generally, the management of natural resources.

The ESGAP framework is both concise and instructive when it comes to the condition of the essential environmental functions that need to be maintained and the processes according to which they can be developed. In other countries and territories, ESGAP can help inform public decision-makers in the global South, and can even alert them to the condition of their territory's environmental functions, thus allowing them to adopt the sectoral and environmental public policies that will be best suited to reaching robust sustainability goals.

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