Ecosystem Natural Capital Accounting (NCA) as tool in support of biodiversity and national park management in West Africa

May 2022

Summary

West Africa is characterized by rapid population growth, endemic poverty and insecurity. This situation is affecting its natural capital and ecosystem services. Natural Capital Accounting (NCA) can provide an answer to the need for evidence-based information for policy-making towards sustainable growth and long-term development.

In the framework of component 2 of PAPBio, a semi-automatized Ecosystem Natural Capital Accounting (ENCA) platform has been developed and evaluated on two protected areas in West-Africa, Niokolo and Bafing Falémé. This platform computes ecosystem accounts in a cost-efficient way over a long timeframe, which allows to monitor and compare ecological values over large areas. The results highlight that both zones have high ecological values, which is in line with their protection status and regional management. However, some low value hotspots have been revealed, such as the corridor between the protected areas. Strengthening of the landscape management plan is here a must. Spots of degradation, paradoxically within areas with high ecological value, highlights the sustained pressure on land.

Based on the lessons learned, it is suggested that the extension of this project focusses on: (i) Capacity building to create a self-reliant community of ENCA platform users in support of decision makers on the long-term, (ii) Evaluating outcomes with local experts to further improve the tool for a better representation of the ecological value of protected areas and (iii) Repacking outcomes in a usable form for decision makers by e.g. expressing the accounting in monetary value.

Context

West Africa, which is already feeling the devastating effect of climate change, is characterized by rapid population growth, endemic poverty and insecurity. This situation is affecting the natural capital as well the ecosystem services it provides, within the region.

Faced with these threats, the European Union, the Economic Community of West African States (ECOWAS), the WEST African Economic and Monetary Union (UEMOA) setup the Support Program for the Preservation of Biodiversity and Fragile Ecosystems, Regional Governance and Climate Change in West Africa (PAPBio), which aims to improve the management of major African natural ecosystems in order to increase resilience of both the ecosystems and the population to climate change.

Conservation and management of natural resources, which is a necessity to sustain our planet, requires well-informed decision making towards sustainable growth and long-term development. Natural Capital Accounting (NCA), also known as ecosystem accounting, can be an answer to the request for evidence-based information for policy-making.

The Ecosystem Natural Capital Accounting (ENCA) framework, which is based on the international SEEA-Experimental ecosystem accounts standard, is a response to the requirement of the Convention on Biological Diversity (CDB) for incorporating biodiversity values into national accounting. ENCA measures the sustainable capacity of ecosystems to supply the services needed by humankind and assess human accountability for ecosystem degradation by inappropriate management.
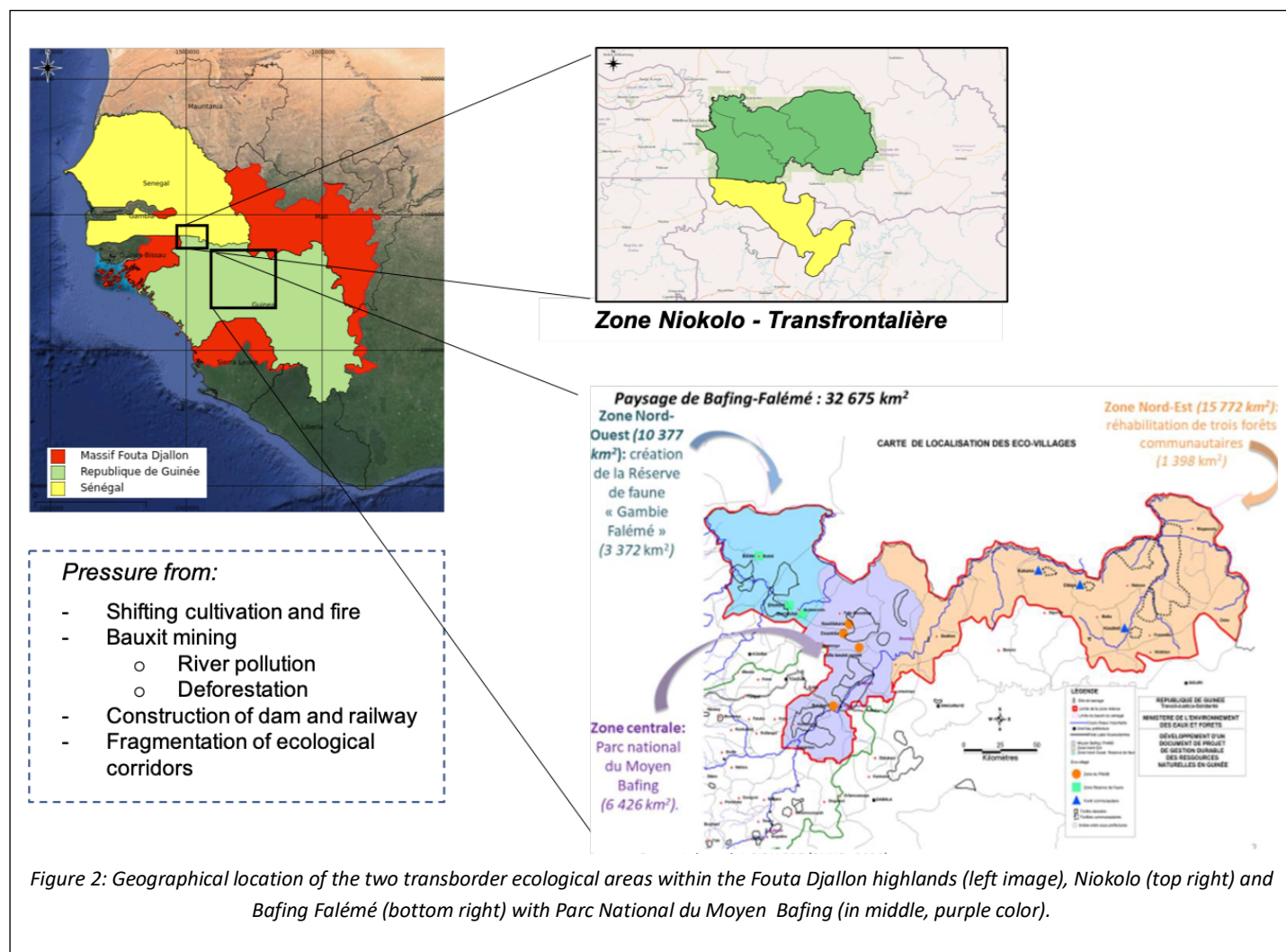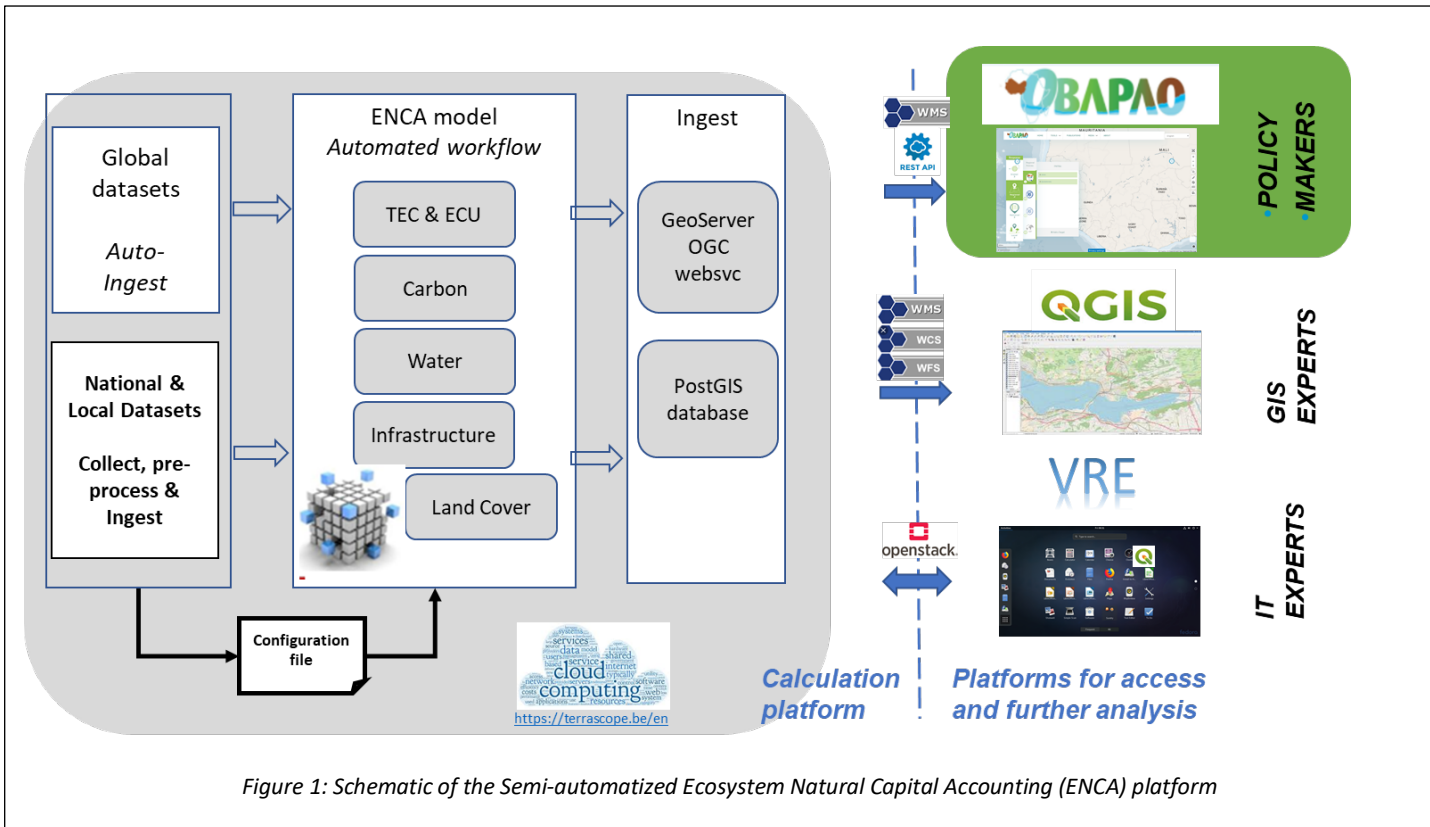
Approach

In the framework of PAPBio, A semi-automatized Ecosystem Natural Capital Accounting (ENCA) platform has been developed (Fig. 1); it computes the yearly ecosystem value of targeted areas by combining the contribution of ecosystem carbon, water and infrastructure -based services. The results are available on the platform through maps and tables, which can be used by the stakeholders to identify critical areas (hotspots) and assess ecosystem degradation and improvement, as well as the potential causes of changes.

An initial platform evaluation has been performed on two zones located in the Fouta Djallon highlands in West-Africa (Fig.2). A multi-level approach has been used to assess the capacity of the platform as an integrated and efficient tool to support decision makers in the context of ecosystem accounting. The three level are:
- **Tier-1 level**, which is a contextual level where country accounts for Sénégal and République de Guinée are computed based on global publicly available datasets,
- **Tier-2 level**, which focusses on the accounting of two large transborder ecological areas within both countries, Niokolo (Sénégal) and Bafing Falémé (République de Guinée), based on national datasets,
- **Tier-3 level**, which focusses on the Parc National du Moyen Bafing within Bafing Falémé, using local datasets, collected by the WildChimps Foundation.

This evaluation process has been performed in collaboration with local experts which contributed during meetings organized by VITO in providing the required datasets, as well in evaluating the platform versatility and results.

Figure 1: Schematic of the Semi-automatized Ecosystem Natural Capital Accounting (ENCA) platform

Figure 2: Geographical location of the two transborder ecological areas within the Fouta Djallon highlands (left image), Niokolo (top right) and Bafing Falémé (bottom right) with Parc National du Moyen Bafing (in middle, purple color).

The accounting of both zones justifies their status of ecological area but also flags hotspots

The ecosystem accounting of the Niokolo and Bafing Falémé transborder areas confirms the high ecological value (~3) of both zones (Figure 3); their values in 2000 were significantly higher (~+30%) than the regional average (~2.3). The nature protection status and the low fragmentation seem to be important drivers of their ecological integrity; the contribution of the infrastructure-based service (orange sections in pie charts of Fig.3) is larger than those of water and carbon-based services. This is however not the case for the corridor between both areas ('corridor' in Fig. 3); here the ecological value is significantly lower compared to the two ecological zones. This corridor is expected to develop into a functional zone of passage for fauna and hence increase biodiversity. This would require the strengthening of the landscape management plan of the region.

Important differences in ecological values are also observed within the protected areas; the southern part of Niokolo and the eastern part of the Bafing Falémé have ecological values of more than 10% below the regional average, while the center of the Bafing Falémé is far above this regional average. The center of this zone is recently recognized as national park, the 'Parc Naturel du Moyen-Bafing' (PNMB) and is characterised by high biodiversity. The parc however faces important threats; housing and urban area, annual and perennial non-timber crops, livestock farming and ranching, planned Koukoutamba dam project, hunting, wood harvest and bush-fires for cleaning agricultural area. It is therefore crucial to keep monitoring this park to preserve its ecological value. On the other hand, in the eastern part of the Bafing Falémé ecological zone, a hotspot of low ecological value ('hotspot 1' in Fig.3) was identified during the accounting. This part of the Bafing Falémé is characterized by human activities such as intensive agriculture and mining. In this part, however, it is targeted to rehabilitate three community forests (Fig.2). To achieve this target, significant changes in management practices will be required.

Concerning Niokolo, the southern part has a significantly lower ecological value ('hotspot 2' in Fig.3) compared to the northern part. The southern part is located in the Republique de Guinee while the northern part belongs to Senegal. Different management practices between both countries explains this difference. On the Guinean side, conservation activities are in practice in the core area of the Badiar Biosphere Reserve, while on the periphery, a co-management system is in place to allow the various communities to use the site for agricultural (rice cultivation) and wood supply.
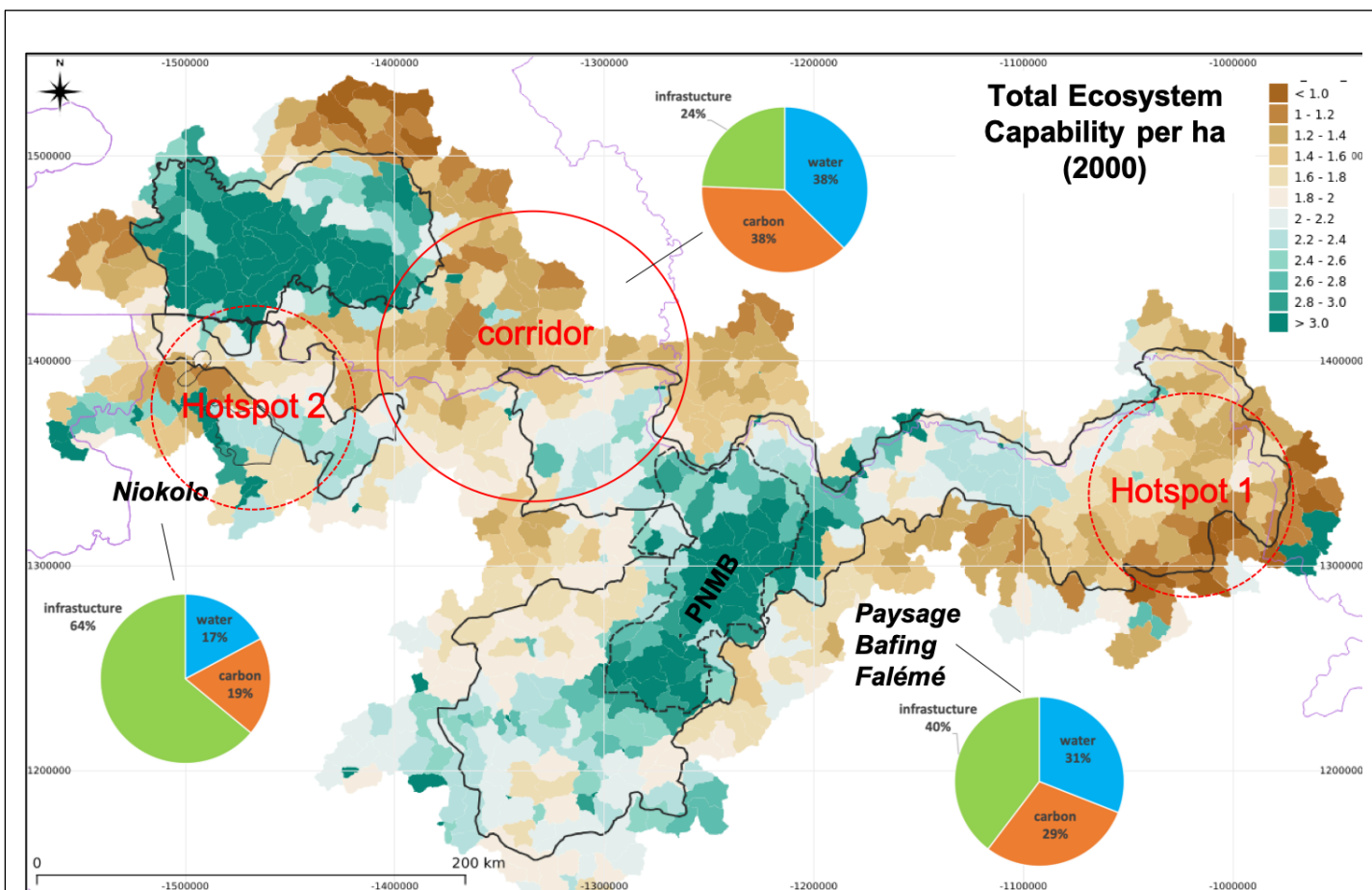

Figure 3: Ecological value of the Niokolo and Bafing Falémé transboundary areas, as computed with ENCA for the year 2000, as well as the contribution of the three components; i.e. ecosystem carbon, water and infrastructure -based services, at tier-2 level.

Pressure on the Paysage induces degradation

Figure 4, presenting the trend in ecological value of the Paysage Bafing Falémé over the period 2000 to 2018, reveals that the value of the Paysage has remained more or less stable over this period. However significant variability within the park can be observed (Fig. 5); some improvements in the western and central part of the park (in green in Fig. 5) have been achieved while the eastern side show gradually decreasing values, with a hotspot in the far east (orange area highlighted as 'hotspot' in Fig.5). Here the ecological value has decreased by around 20% over the period 2000-2018 (Fig.4). As mentioned earlier, this area is subject to intensive agriculture and mining practices. An increase of these human activities might be the underlying cause of this rapid degradation. To counteract this trend, good governance and adaptations of the practices will be required. Outside the boundaries of the Paysage, small spots of degradation are also noticeable (in red-orange in Fig. 5). A reason for this might be the increased pressure on the park, due to increased population, poverty and insecurity, in the neighboring villages. Although the high ecological value in the center of the Paysage (Fig.3), the value of the Natural Parc du Moyen-Bafing (PNMB) has decreased during the last reporting year (Fig.4).

Figure 5 reveals a zone of degradation at its centre. This could be connected to preparatory work for the new hydro-electricity dam (Koukoutamba) in the southern part of the park. Given that the Bafing river flows north, this dam will probably have an impact on the entire park and all further upstream areas. Future scenarios on development could help to assess the evolution of the ecosystem value and to anticipate the required management to avoid further degradation.
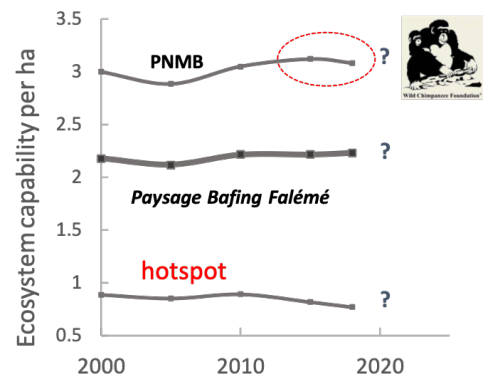

Figure 4: Trend between 2000 and 2018 of the ecosystem capabilities of the Bafing Falémé, the Parc Naturel du Moyen-Bafing (PNMB) and the hotspot detected in the eastern part.
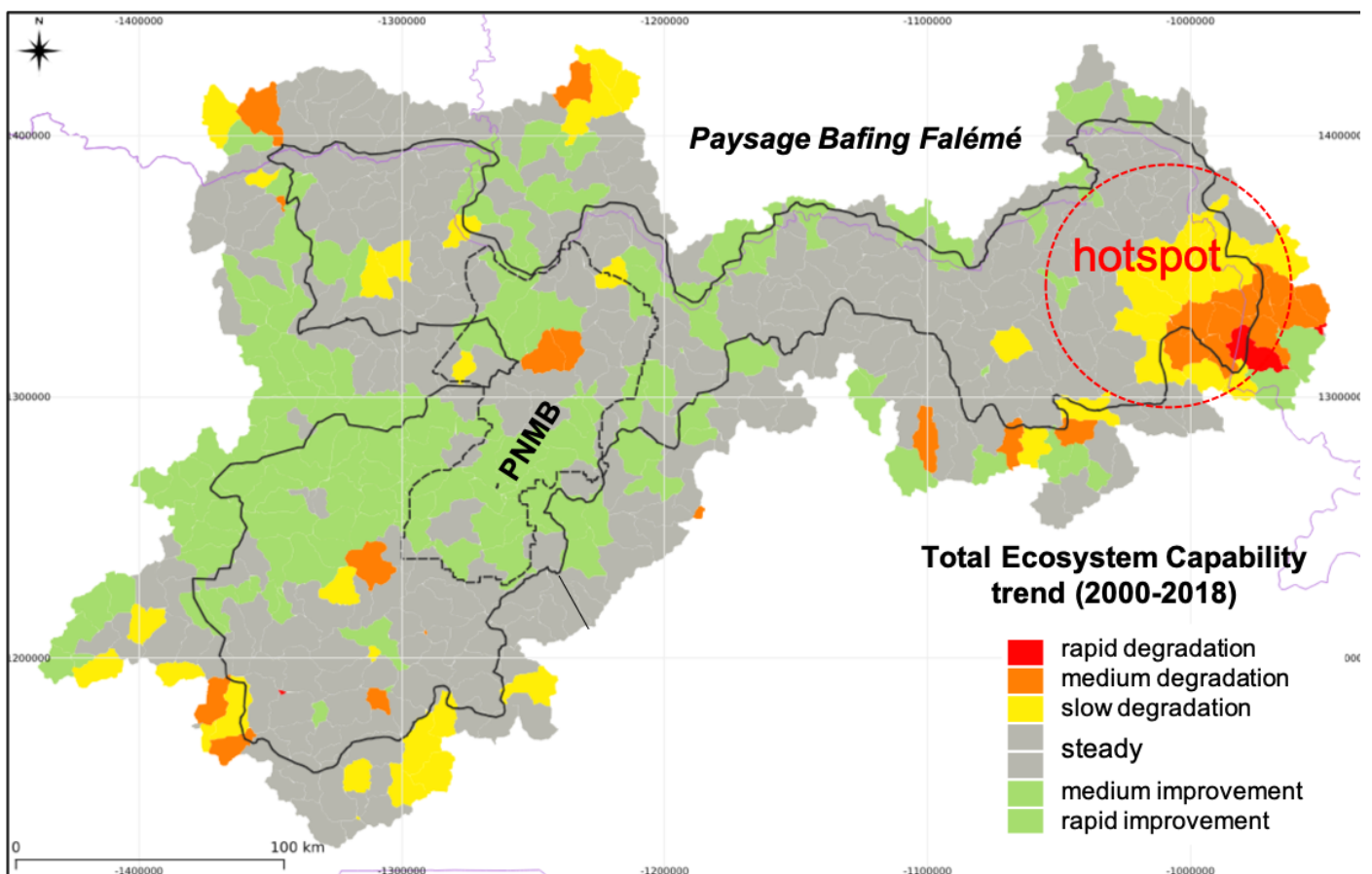

Figure 5: Trend between 2000 and 2018 of the ecological value of Bafing Falémé transboundary area, as computed with ENCA.

Outcomes and lessons learned from Phase I

The results of the ENCA accounting, highlighted that both areas have high ecological values, which is in line with their protection status and regional management. On the other hand, the corridor between both has a significantly lower ecological value, despite the fact that it is expected to develop into a functional zone of passage. The potential of this corridor to provide regulating and socio-cultural services, as measured in ENCA through the infrastructure-based service, is small. Strengthening of the landscape management plan in the region is a must. Hotspots of lower ecological values have been identified within both zones; i.e the southern part of the Niokolo and the eastern part of the Bafing Faleme. Difference in management practice and poor governance, respectively, could explain this; the eastern part of the Bafing Faleme is showing rapid degradation while this is not the case for the southern part of Niokolo (not shown in figures). Despite its high ecological value, the Natural Parc du Moyen-Bafing (PNMB) has shown a decrease in value over the last year, mainly due some degradation at its centre. This could be connected to preparatory work for the new hydro-electricity dam (Koukoutamba) in the southern part of the park.

We may conclude that the ENCA tool provides a well-structured basis for monitoring and evaluating current and prospective programs and governance practices. The relevancy of the results, however, depends largely on input data, methodology, functionality as well as on the interpretation of the results. The evaluation of these elements is therefore capital and has to be in collaboration with local experts. COVID-19 has however significantly impeded this process as physical meetings could barely take during the project. The results of such an evaluation will further lead to an improvement of the tool and its use. During the meetings with local and regional representatives it also came forward that the interpretation of the results by decision makers was not straightforward and that a common and tangible term is required. Finally, all the above is solely sensible if the knowledge built during phase I is transferred to the relevant experts, analysts and decision makers.

Recommendations for Phase II

Based on the lessons learned, the extension of this project should now focus on the interpretation and use of the results by analysts and policy makers, as well as on their relevance for the management of protected areas. Having the tool now in place as well as the initial practical experience with the case study of Niokolo and Bafing, this second phase must:

- build ecosystem accounting capacities (methodology, use of the tool, interpretation of results, etc.) by training regional, national and local partners to create a self-sufficient community of ENCA platform users in support of decision makers in West-Africa on the long-term
- evaluate the approach and outcomes in collaboration with local experts and users, based on the lessons learned from phase I, to improve the tool for a better representation of the biodiversity and ecological values of protected areas,
- repacking outcome in form to ease the use by decision makers in the field of protected area management and biodiversity conservation e.g. by developing a first approach to express the accounting in monetary value.

It is proposed to further pilot the ecosystem accounts in the Bafing and W-Arly-Pendjari Complex and to increase the frequency of the accounting to yearly values, and this in collaboration with local experts.

In summary, the focus should be on: i.e. capacity building (i), system evaluation (ii), system improvement (iii).
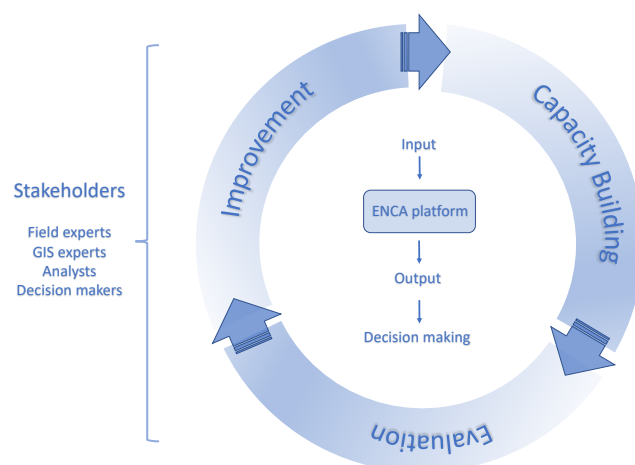

Figure 6: Schematic of the different components of the extension phaseI.

These three strongly interact with each other (Fig.5) and require the involvement of field and technical experts, analysts and decision makers, and cover all items of ENCA accounting from input data, platform methodology and technicalities till outcome and its repacking to usable information for decision makers.