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Ecosystem degradation is absent from accounting standards, creating systemic ecological debts. Internalizing the consumption of natural capital has been the focus of INSEE "comptes du patrimoine naturel" in France, of several programs launched by the United Nations, Eurostat, European Environmental Agency, and lately the Aichi objectives on biodiversity.

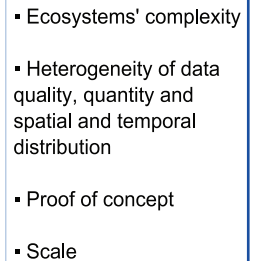


ENCA integrate balances of bio-carbon, land, water and river systems infrastructure and biodiversity. In this poster, we present the river water accounts and land cover changes of the French Rhône River watershed.

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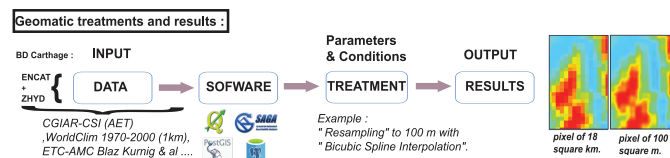
Measure the impact of economic activities on ecosystems structures and functions and the sustainability of the resource/services that they provide with the purpose of completing accounting standards from which ecosystem degradation is absent.

Establish balance sheets to record ecological debts and credits of countries, enterprises...



Accounting framework

- Basic quantitative balances of stocks, flows and resource use of land/ biodiversity, biocarbon and water, combined with a diagnostic of ecosystem health.
- Sustainable capacity of all delivering services and measurements of degradation or enhancement with a composite unit of ecological value (Ecosystem Capability Unit, ECU).



Mathematical calculation : The sum of the kmcn calculated per reach (index b) is equal to the calculated total kmcn as an average rate applied to all the calculation sections, indexed by t...

Equation 1 : $\bar{Q} = \sum_{i=1}^n \sum_{j=1}^m \sum_{k=1}^p (Q_{ijk} \times L_{ijk})$, avec $\sum_{i=1}^n \sum_{j=1}^m L_{ijk} = \sum_{i=1}^n \sum_{j=1}^m L_{ij}^0$

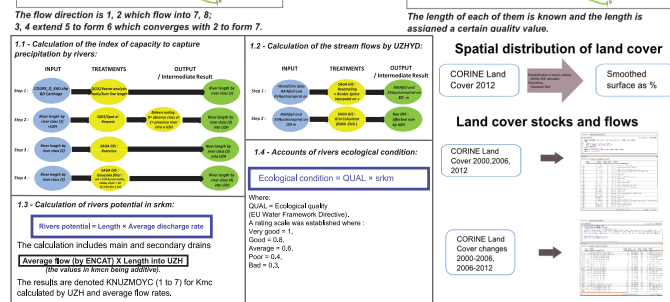
Extrait de « Crousset P., Germain, C et Le Gall, G, 1999, Les Couleurs de la qualité des cours d'eau. Mise en oeuvre d'une méthode simplifiée de calcul. Etudes et Travaux n° 5, IFRE, Orleans », p. 21

8 reach (with 1 x 8)

➔ simplification ➔

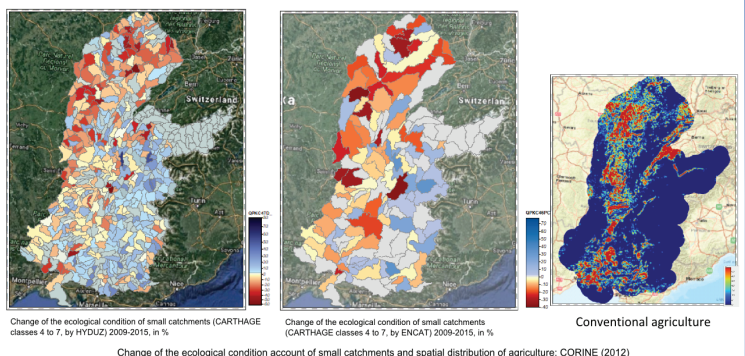
• Méthode simplifiée:

➔ 3 tronçons homogènes (ab, cd, ef)

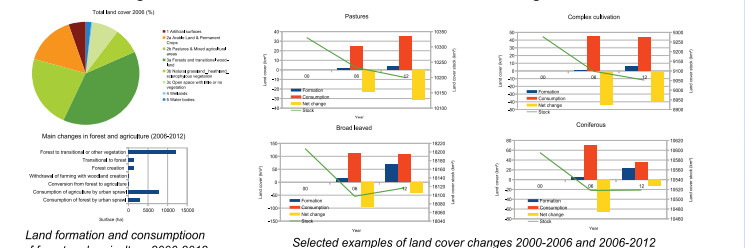


- **Ecological condition of small rivers, state and change 2009-2015**

The maps of changes in the ecological condition of small French rivers (order classes 4 to 7) show an improvement in mountain areas and a strong degradation in the plain. The pollution of small rivers is local and can be related to land use (compare figures). For river classes 1-3, pollution accumulation upstream is the rule ; the analysis indicates a strong correlation with density of obstacles to flow and a prevalence of low water quality on right banks (not shown).

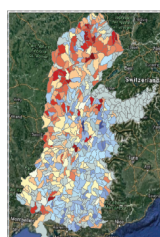


47% of Rhone basin's land cover consists of forest and natural areas, while 38% is agricultural land. The data also show decline in vegetated area.



The presented proof-of-concept for water and land accounts at 1ha resolution is an application globally reproducible at regional scale.

- extension to the entire Rhône watershed (cooperation with EPFL and OFEV).
- evaluation of accessible versus available water resource.
- calculating the ecological value of the watershed area (see scheme) to inform on degradation, stability or improvement trends over time.
- optimization and automatization of the ENCA tool (data accuracy, annotation, etc...)



Net River Ecological Potential (NREP)

