

MAPME Initiative

Versatile analysis tool for big geospatial data in the context of sustainable development

Darius A. Görgen

2024-04-18

Overview

- What is the MAPME Initiative?
- What tools do we develop?
- How do we use them?



Abstract EGU24-18584



Sharing is encouraged!

MAPME Initiative

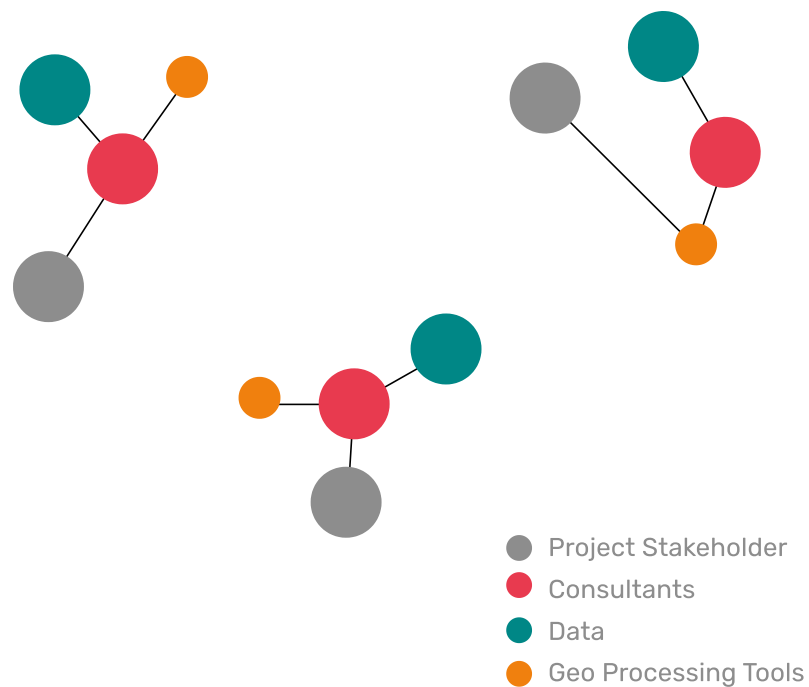
MAPME Initiative



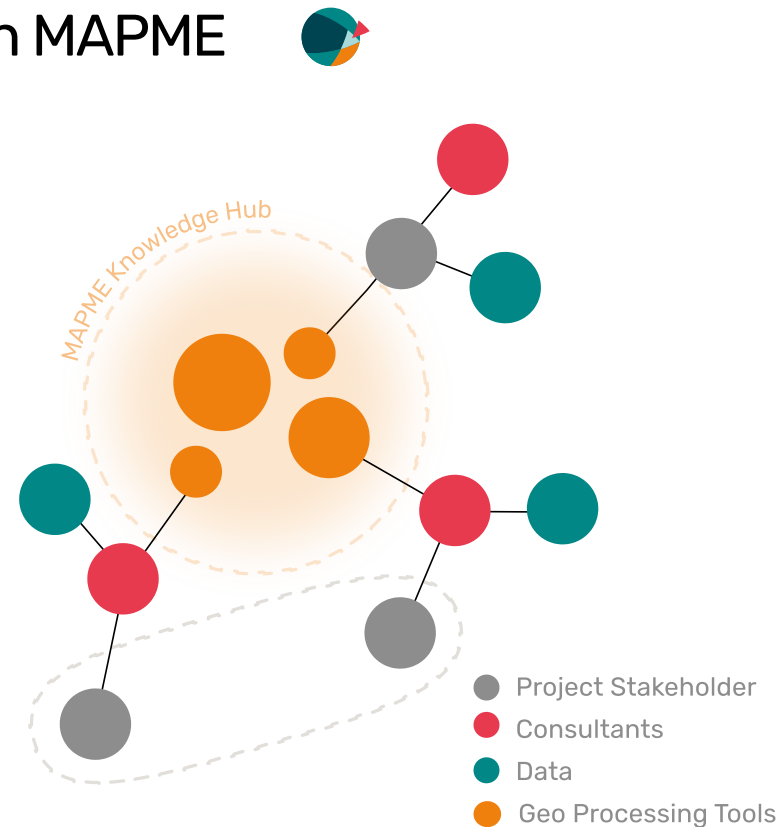
- MAPs for **P**lanning, **M**onitoring, and **E**valuation in the development cooperation sector
- driven by geo-enthusiasts in [KfW](#), [IRD](#), [AFD](#), and [GIZ](#)
- based on the [principles of digital development](#):
 - design with people
 - share, reuse, and improve
 - use evidence to improve outcomes

MAPME Initiative

Without MAPME



With MAPME



MAPME Tooling

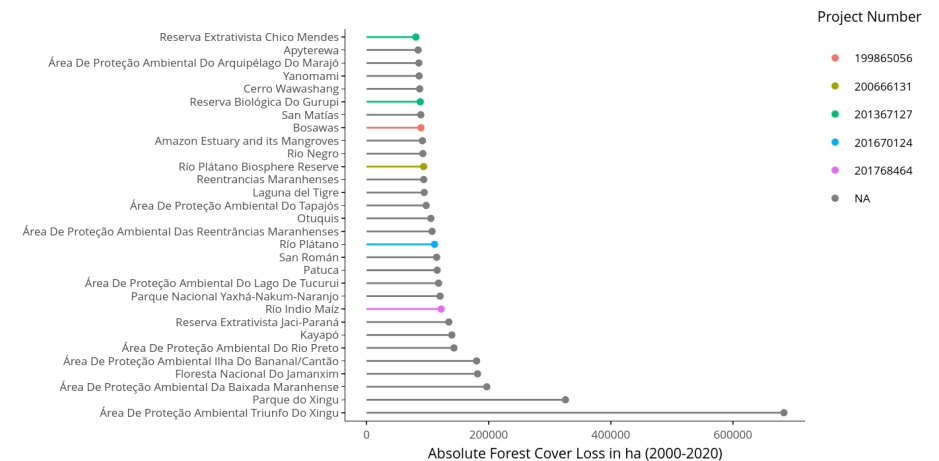
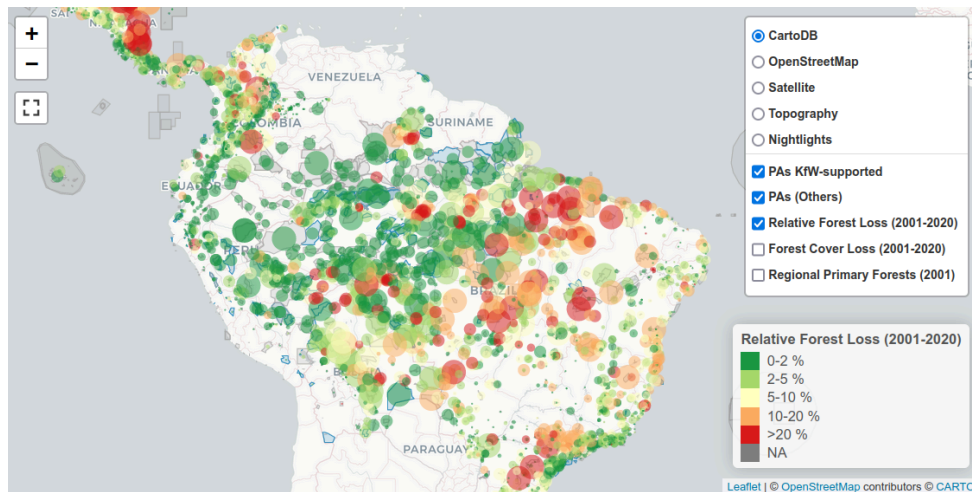
MAPME Tooling



MAPME tooling can be found online on github.com/mapme-initiative.

Use cases

Monitoring forest loss in Latin America



Open-source analysis and reporting [codes](#) developed by KfW.

Measuring project impact to reduce forest loss

KfW Development Bank
Evaluation Department

Geo-spatial impact assessment of financing area-based conservation
COP15 Montréal Edition

December 2022
by Melvin Wong (Corresponding author: melvin.wong@kfw.de), Johannes Schielein, and Jochen Kluge

Uncertainty about the effectiveness of area-based conservation is a major challenge to secure financing of protected areas. KfW's transparent and replicable geo-spatial impact approach demonstrates that the financing of protected areas does effectively reduce forest cover loss.

The challenge to monitor forest cover loss
Monitoring data on forest cover loss may be misleading in assessing protected areas' (PA) effectiveness, because forest cover may decline even in PAs. Such doubt reduces the trust and financing of conservation measures and undermines efforts to reduce forest cover loss and CO₂ emissions.

A geo-spatial approach for impact assessment
As one of the largest development partners working to maintain biodiversity worldwide, KfW Development Bank developed a framework integrating development finance project information with open-source geo-data on forest cover loss to quantify PAs' effectiveness. The scientific method proceeds in three steps:

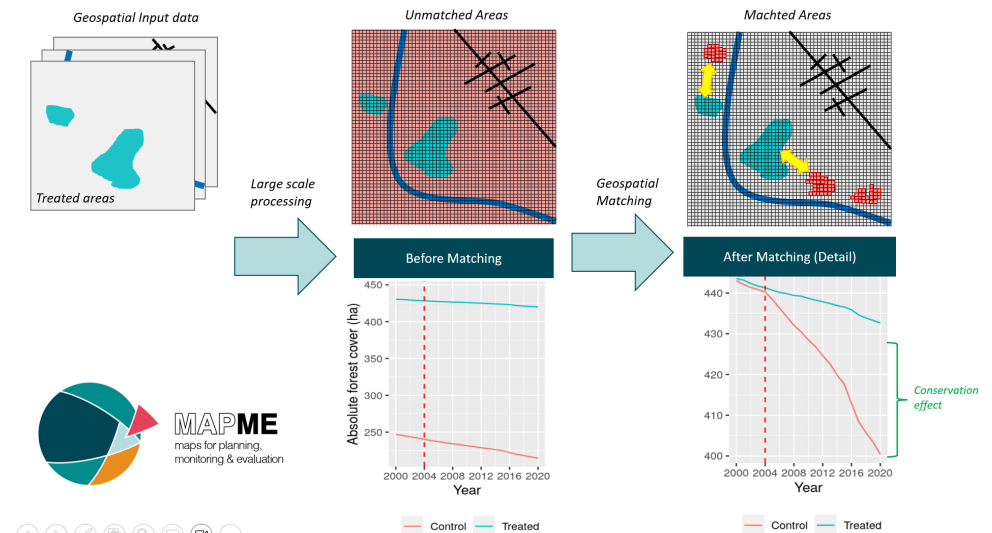
- 1) Access and assemble project and open-source data**
About 400 financed PAs (~93 mil. Ha or the area of Pakistan) are linked to zones in the World Database on Protected Areas. KfW's MapMe Biodiversity R package facilitates the identification and download of all necessary geo-spatial data to perform the impact assessment.
- 2) Perform statistical analysis**
The challenge: comparing PAs with a control group of non-protected areas is subject to selection bias; for instance, PAs tend to be located in more remote areas. The solution: KfW's analysis framework ensures an apples-to-apples comparison by finding a "statistical twin" through an elaborate yet transparent matching procedure. For instance, the matching procedure aligns non-protected and protected areas only if they exhibit a similar travel distance to the nearest settlement.
- 3) Communicate PA effectiveness**
The engagement of KfW and its partners, on average, effectively contribute to reducing forest cover loss in PAs compared to similar non-PAs. The graph shows that, initially, the respective forest cover in PAs and control areas is similar. In addition to a similar down-ward trend until the project's start year. After project start, control areas have a stronger rate of forest cover loss than PAs. The gap between the two trend lines measures the conservation impact of financing the PA.

An example project: Forest cover loss over time in PA areas with development finance ("Treated") vs. comparable non-PA forest areas ("Control"). The red dashed line is the year when development finance was disbursed. Before disbursement, treatment and control areas have a similar downward trend in forest cover. After disbursement, control areas forest cover decreases more strongly, and the rate of forest cover loss increases while relatively less forest cover is lost in treatment areas. Source: KfW.

Given the statistical assumptions, the financed projects overall contributed to 3-8% of the PA's area in avoided forest cover loss. The average effect is estimated to be roughly 5.7 mil. ha (the area of 8 mil. soccer fields or the area of Togo) in avoided forest cover loss for KfW's engagement in Latin America and the Caribbean.

Next steps
KfW's evaluation department mainstreams this analysis for its project portfolio. Moreover, classifying the project interventions by IUCN action types will be crucial to formulate detailed lessons learnt on "what works" in area-based conservation. This framework serves as an evidence and communication tool that financing measures in PAs is effective to conserve forests.

The findings, interpretations, and conclusions expressed in this article are entirely those of the authors. They do not necessarily represent the views of KfW and its affiliated organizations.



Matching approach to estimate avoided forest loss presented by KfW at COP15.

Online training materials for university students

Analyses spatiales avec R et mapme.biodiversity : application aux mangroves et forêts protégées sénégalaises

AUTHOR
Lenaïg Moign, Florent Bédécarrats

1 Objectifs de la formation

1. Prendre conscience du potentiel des données en open data
2. Comprendre la manière dont sont structurées les données spatio-temporelles
3. Entretenir un recul critique sur les données
4. Comprendre dans quels cas l'utilisation de R est opportune
5. Se familiariser avec la logique et les méthodes de traitement sous R
6. Identifier comment approfondir sa maîtrise si opportun

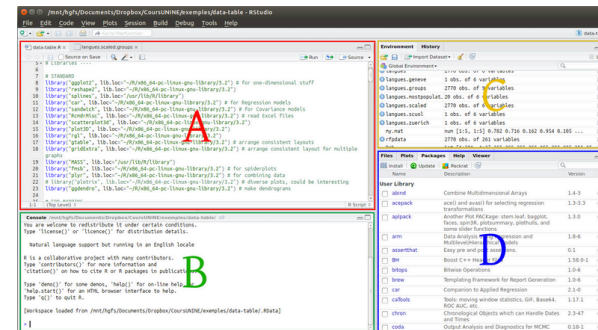
Discussion : Avez-vous une expérience avec R ? Partagez-vous ces objectifs ? Quels sont vos commentaires à leur égard ?

2 Prise en main de RStudio

- Décompresser le fichier de données téléchargé dans un dossier de travail.
- Ouvrir RStudio
- File > New project > Existing directory : sélectionner le dossier de travail

2.1 Interface

L'interface comporte quatre fenêtres :



Fenêtre de l'interface utilisateur R studio (Source : ourednik.info)

Table of contents

- 1 Objectifs de la formation
- 2 Prise en main de RStudio
- 3 Dans quels cas on utilise R ?
- 4 Installation et chargement des librairies R
- 5 Chargement des données sur les aires protégées
- 6 Exploration des données disponibles sur les aires protégées
- 7 Produire des cartes synthétiques sur les aires protégées
- 8 Acquisition de données environnementales et calcul d'indicateurs
- 9 Carte des mangroves
- 10 Exploitation des statistiques produites
- 11 Références

Open materials developed by IRD for a training session in Sénégal.

Thank you for your attention!

References

- GDAL/OGR contributors. 2024. *GDAL/OGR Geospatial Data Abstraction Software Library*. Open Source Geospatial Foundation. <https://doi.org/10.5281/zenodo.5884351>.
- Hijmans, Robert J. 2024. *Terra: Spatial Data Analysis*. <https://rspatial.org/>.
- Lenaïg Moign, Florent Bédécarrats. 2023. French National Research Institute for Sustainable Development. https://lenaigmoign.github.io/JUMI_R/.
- Melvin Wong, Jochen Kluve, Johannes Schielein. 2022. Kreditanstalt für Wiederaufbau (KfW). https://www.kfw-entwicklungsbank.de/PDF/Evaluierung/Themenbezogene-Evaluierungen/FZE_PA_onepager.pdf.
- Pebesma, Edzer. 2018. “Simple Features for R: Standardized Support for Spatial Vector Data.” *The R Journal* 10 (1): 439–46. <https://doi.org/10.32614/RJ-2018-009>.