



Tropentag, September 20-22, 2017, Bonn

“Future Agriculture:  
Socio-ecological transitions and bio-cultural shifts”

## RESTORE+: A New Methodology for Addressing Landscape Restoration on Degraded Land (in Indonesia and Brazil)

CHARLOTTE KOTTUSCH<sup>1</sup>, JASMINE PUTERI<sup>1</sup>, PING YOWARGANA<sup>1</sup>, LINDA SEE<sup>1</sup>, SABINE FUSS<sup>2</sup>,  
SONYA DEWI<sup>3</sup>, ALINE MOSNIER<sup>1</sup>, FERNANDO RAMOS<sup>4</sup>, GILBERTO CÂMARA<sup>4</sup>, NIRATA SAMADHI<sup>5</sup>,  
ZULFIRA WARTA<sup>6</sup>, PAUL CHATTERTON<sup>7</sup>, FLORIAN KRAXNER<sup>1</sup>

<sup>1</sup>*International Institute for Applied Systems Analysis, Austria*

<sup>2</sup>*Mercator Research Institute (MCC), Germany*

<sup>3</sup>*World Agroforestry Centre, Southeast Asian Research Program, Indonesia*

<sup>4</sup>*National Institute for Space Research (INPE), Brazil*

<sup>5</sup>*World Resources Institute (WRI), Indonesia*

<sup>6</sup>*WWF Indonesia, Indonesia*

<sup>7</sup>*WWF Austria, Austria*

### Abstract

The complex interaction of ecosystem services, biodiversity, and socio-economic activities calls for a landscape approach to complement large scale conservation efforts. Such an approach requires the need to address multiple objectives in a comprehensive and integrated way in areas where pressure for high-monetary value activities are in direct competition with environmental benefits and biodiversity resources. Yet complex interactions and inclusive processes in landscape approaches make it challenging to formulate assessment mechanisms that allow for robust yet operational evaluation of projects. To address this challenge, the RESTORE+ project (R+) has developed a methodology that combines multi-objective modelling with advanced big data and citizen-sourced remote sensing analyses to obtain information on biophysical and social complexity of degraded/marginal land.

Using the R+ methodology, the project aims at providing the two focus regions, i.e. Indonesia and Brazil, with scenarios for restoration and sustainable utilisation of degraded land, and their implications on production, biodiversity, GHG emissions and social impacts (e.g. land tenure rights).

In Indonesia, IIASA's global land use model (GLOBIOM) will be adapted for the national level to analyse the dynamics of varying land use policies that include an array of degraded/marginal land utilisation scenarios. The modelling approach will be combined with participatory crowdsourced mapping campaigns, to map potential degraded/marginal land in high resolution. Utilizing crowd-empowered data gathering methods, the information that is gathered can go beyond bio-physical properties. Moreover, the restoration and utilisation cycle will look specifically into bioenergy commodities. Specific to Indonesia, various supply chain implications of varying policy scenarios to utilise degraded/marginal land for bioenergy will be analysed with a techno-economic engineering model (BeWhere), intended to merge the land use and energy sector perspectives for landscape energy planning.

In Brazil, the project will enhance established land monitoring and modelling capabilities and support Brazil's contribution to meeting the "Bonn Challenge". The project will identify degraded areas, assess restoration options and explore trade-offs associated with implementation of the Brazilian Forest Code.

By exploring restoration and utilisation options of tropical degraded, abandoned and/or marginal land, based on interlinked qualitative information with socio-economic and environmental parameters, the new R+ methodology will contribute to easing pressures on deforestation as well as mitigating climate change.

**Keywords:** Crowdsourcing, degradation, landscape restoration methodology, multi-objective modelling, remote sensing