



Netherlands Environmental Assessment Agency

Improvement of the national application of the Globio model: General and for Brazil

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Improvements / challenges for development

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- General improvements
- Land use change (claim, allocation, effect)
- Nitrogen (deposition, resolution, effect)
- Climate (resolution, effect: species models)
- Fragmentation (patch size, connectivity, barriers meta-population, effect)
- Infrastructure (Road map, extrapolation of roads, effects)

Improvements / challenges for development

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- More pressure factors
e.g. effects of fire; mining, hunting and poaching
- Include water ecosystems
(lakes, rivers, coasts, oceans)
 - Currently GLOBIO for lakes, rivers and wetlands develops
 - Development of Ocean model is ongoing
- Automation of calculations

Land use improvements (1)

- Use Local Land use dataset
- Assign biodiversity values per land use type
 - using local experts
 - Interpolation of MSA values generic Globio3 biodiversity value table

Assigning biodiversity values for national land use classes

Example: Vietnam forest classes

Biodiversity values generic land use types (scientific base)

Biodiv class name	MSA value
Primary forests	1.0
Forest plantations	0.2
Secondary forests	0.5
Light used primary forests	0.7
Agro forestry	0.5
Extensive agriculture	0.3
Irrigated intensive agriculture	0.05
Intensive agriculture	0.1
Perennials & bio fuels	0.2
Natural grass & shrub lands	1.0
Man made pastures	0.1
Livestock grazing	0.7
Natural Bare, rock & snow	1.0
Natural inland water	null
Artificial water	null
River/stream	null
Built up areas	0.05

**Interpolation
of values**

**based on
Expert
knowledge**

Interpolated Biodiversity values national land use types

Code	FIPI original (2002)	Local MSA value
10	Natural Timber Forest	0.9
11	Rich Forest	1
12	Medium Forest	0.8
13	Poor Forest	0.6
20	Young Forest	0.55
21	Reforestation Rich	0.45
22	Reforestation Medium	0.4
23	Young forest with volume	0.55
24	Young forest with no volume	0.45
31	Dipterocarp forest (deciduous)	0.95
32	Semi- deciduous forest	0.95
41	Natural conifer forest	0.95
42	Mix forest (Broad leaf and conifer forest)	0.8
51	Bamboo forest	0.45
52	Mix forest (Timber+bamboo forest)	0.55
60	Mangrove forest	0.8
70	Plantation forest	0.2
71	Speciality forest	0.9

Land use improvements (2)

- Effects
 - Review of existing studies in the region: reports, publications, datasets
 - If available:
 - *collate data on habitat suitability of land use types for a selection of species,*
 - *combine with changing land use*
 - *Derive changing distribution of species*
 - *Calculate MSA*
 - If no data are available: set-up a field study
 - *Define land use types*
 - *Design sampling scheme*
 - *Select species groups*

- Current approach
 - Use coarse scale IMAGE N-exceedence maps, link to GLOBIO3 relationships
- Improvements:
 - Develop local nitrogen deposition model (including critical loads. Process to describe is:
 - *Estimate emissions of N from agriculture and road traffic*
 - *Air-transport model + Meteorology*
 - *Calculate deposition of N*
 - A more simple approach:
 - *Different types of land use have different N-emissions*
 - *Buffer these areas in a few directions and assume a decreasing function with distance*
 - *Change in land use will yield a change in N-deposition*
- Effect
 - Use local long term experimental studies
 - Conduct new studies

Example:

Improving Nitrogen deposition module for national scale

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1. Derive ecosystem specific Critical loads
2. Derive deposition maps
3. Derive dosis-effect functions

- Current approach
 - Use road and population density maps, construct buffers, buffers increase according to scenario
- Improvement
 - Improved road and settlement maps
 - Forecast road development (e.g. by collating data on road construction plans and other development plans)
 - 2nd step: Find data on species response to roads and settlements. The response can be population decrease related to distance

Synergie with Species modelling

- MSA is only one of the indicators for biodiversity
- Combination of pressure model with other models such as species model add value to information on biodiversity
- Validation of Globio3 and Clue with other models
- Field work for both can be combined, especially useful for determining MSA loss for land use change, infrastructure developments and fragmentation processes

Optimal: Network Ecological Monitoring

- Coherent network of biotic monitoring schemes
- Statistically reliable and sensitive
- Representative and continuity

Plants, birds, butterflies, dragonflies, reptiles, amfibians, mammals, bats, and funghi



Biodiversity modelling network Brazil:

Using existing spatial data:

- Land use / cover data, vegetation maps, biome maps and other spatial data from IBGE, Embrapa, INPE, MMA, INPA, Reserva biosfera Caatinga, UFRGS, a.o.

Using modelling results:

- Specific cause - effect relations (e.g. Road impact modelling, Climate modelling, Deforestation modelling)
- Existing scenarios (Caatinga, deforestation)
- Validation of Globio3 and Clue
- Added pressure: synergy of deforestation and climate effect
- Using PELD aquatic model for integration with aquatic model PBL
- Species/habitat modelling to link with Globio3 pressure model

Biodiversity modelling network Brazil:

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- Using existing inventory data on species abundance and species richness to validate or specify MSA_lu for land use classes in Brazil
- In case of lacking data using expert knowledge to rank and interpolate specific Brazilian land use classes

Implementation Globio3 in Brazil

Some parallel actions:

- Running Globio3 with existing data (results by end of 2009)
- Validation exercise (Sao Paulo district) (results 2010?)
- Improving Globio3 methodology with: (2010 - ?)
 - expertise and existing models,
 - Species abundance data for specific land use classes,
 - Improved dose – response relations per pressure
 - Adding pressures
 - ..