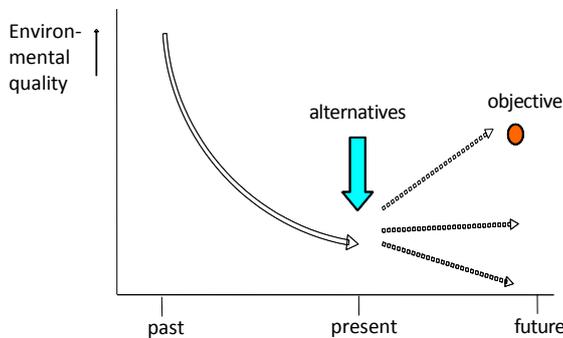


# Policy support tools to determine the relation between land use, socio economic developments and environmental services

*Land use and biodiversity modeling will help policy makers to analyze the impact of socio economic developments on land use and biodiversity. The impact of different policy options can be assessed in a relative simple way and will enable policy makers to test whether policies are likely to meet environmental objectives.*

Policy-makers are increasingly aware of the relations between land-use change, ecosystem services and food security. Many socio-economic developments lead to land use change and thus have a direct impact on food security. Land use change also affects biodiversity and the quality of ecosystem services which are critical to sustain food security. In addition, ecosystems with watersheds in good condition are critical for the provision of safe water supply. Policy makers need to be well informed about the expected trends in land-use and ecosystem services. Moreover, to formulate alternative policy options there is need to understand the drivers of ecosystem change.

*Assessing the impact of policy options on ecosystems.*



Source: Netherlands Environmental Assessment Agency (PBL).

The methodology of Plansup is to analyze the impact of land-use change and socioeconomic developments on ecosystems. The potential use of models for food security and water is two-fold:

- The impacts can be assessed of changes in land-use and ecosystems on food security and access to water.
- The impacts on ecosystems can be assessed of policies that aim to strengthen food security and / or access to water, in combination with other drivers such as climate change.

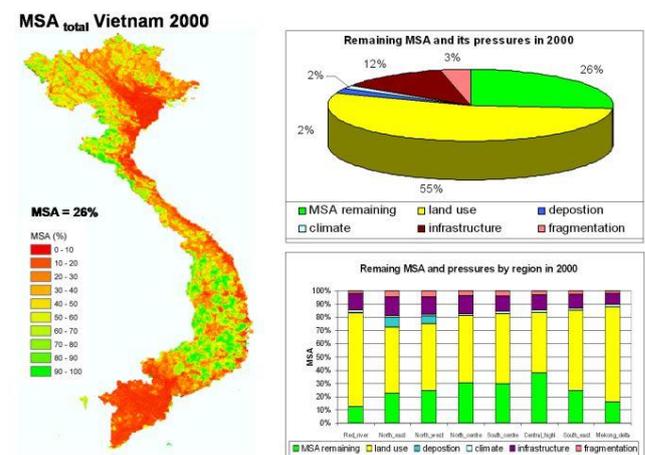
Plansup integrates two models: **1)** The CLUE model, developed by the Wageningen University and the Free University of Amsterdam, to assess land use change, and **2)** the GLOBIO3 model, developed at the Netherlands Environmental Assessment Agency to assess biodiversity change.

Modeling can help understand key policy questions:

- *What is changing* (indicators, land use and biodiversity status)?
- *Why is it changing* (pressures, trends, modeling)?
- *Why is it important* (land use and ecosystem services)?
- *What can we do about it* (assessment of main drivers and underlying policies)?
- *What is the impact of policies* (scenarios and assessments of the impact of different policy options)?

The GLOBIO3 model has been developed to assess the impacts of human-induced changes on terrestrial biodiversity (past, present and future at different scales). The model uses a composite indicator that describes the “naturalness” of an area compared with its undisturbed situation, combining ecosystem extent with ecosystem quality. GLOBIO3 is built on simple cause-effect relations between pressures and biodiversity impacts. Pressures include land use change, infrastructure development, fragmentation, climate change, and atmospheric nitrogen deposition. GLOBIO3 has been used successfully in several integrated assessments at global, regional, national and sub-national level.

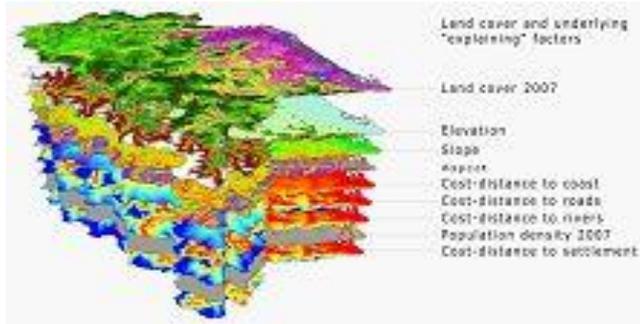
*Ecosystem change in Vietnam specified for biodiversity, expressed as MSA. The pie chart shows biodiversity loss per pressure, the histogram show proportions per region.*



Source: Plansup

The GLOBIO3 model is integrated with the CLUE land use model to assess the impact of land use change on future biodiversity. Land use scenarios are an important input for CLUE and can be developed with the help of macro-economic models or created as part of a policy process with stakeholders. The integration of GLOBIO3 and CLUE allows assessments to be made of the impact of different scenarios or policy alternatives on land use change and ecosystem quality. If results are not in line with land use and biodiversity policy targets (e.g. CBD), policies can be adjusted.

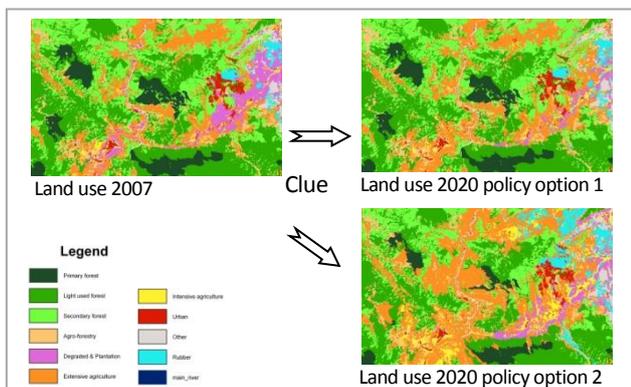
Thematic maps that have a relation with land use are used in CLUE to determine future land use allocation.



Source: Environment Operations Center (ADB-EOC).

Both CLUE and GLOBIO3 can be used free of charge. The GLOBIO3 methodology is software independent and can be customized if needed. Any GIS software can be used as long as it can handle raster maps. The CLUE model software is distributed as freeware.

Detail central part of Quang Nam province in Vietnam. Land use 2007 map and Land use 2020 maps calculated with Clue for a conservation policy option (1) and a maximum food and timber production policy option (2)



Source: Plansup.

Overlaying future land use and biodiversity maps with other spatially explicit data such as protected areas, water catchments, sectoral and spatial plans, etc., provides relevant information for the assessment of impacts of specific socio-economic developments. Combined with flood and drought maps and data on crop productivity, valuable information can be generated on the integrated impact of socio economic developments and climate change on food security.

Plansup carries out assessments for clients, but also provides capacity development to organizations to make land use and biodiversity modeling an integral part of selected decision support tools.

### What does Plansup offer?

Plansup offers the following services:

- Training in land use and ecosystems quality modeling. For instance at your institute and part of Integrated Assessments;
- Working sessions in modeling and land use scenario building;
- Assessment of current and future land use and impacts on ecosystems for any country;
- Advice on the development of policy alternatives. Assessment of current and future land use and impacts on ecosystems for any country;
- Analysis of the impact of existing and future socio-economic developments (e.g., food security policies) on ecosystems;

The models help decision-makers and policy-makers to:

- Analyze the impact of existing and proposed policies on land use change and ecosystems, in relation to other pressures such as climate change;
- Quantify and spatially allocate the past, current and future land use and selected ecosystem services, e.g. watersheds, biodiversity;
- Generate expected land use and biodiversity trends under various policy options or future scenarios.

### Experience

Plansup has carried out several national assessments and modeling training schemes in The Netherlands, Thailand, Vietnam, Honduras, and Zambia. More than 100 participants from over 20 countries have been trained.

Recently Plansup implemented the GLOBIO3 and CLUE models for the province of West Kalimantan, Indonesia as part of the ex-post analysis to assess the impact of the oil palm sector in Kalimantan sector in Kalimantan. The project was conducted in collaboration with PBL and Aidenvironment Asia for the Convention of Biological Diversity (CBD).

For more information on GLOBIO 3 and CLUE:

- <http://www.globio.info/>
- <http://www.jvm.vu.nl/CLUE>

### Interested?

Contact modeling expert and trainer **Wilbert van Rooij** to find out what Plansup can do for you

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