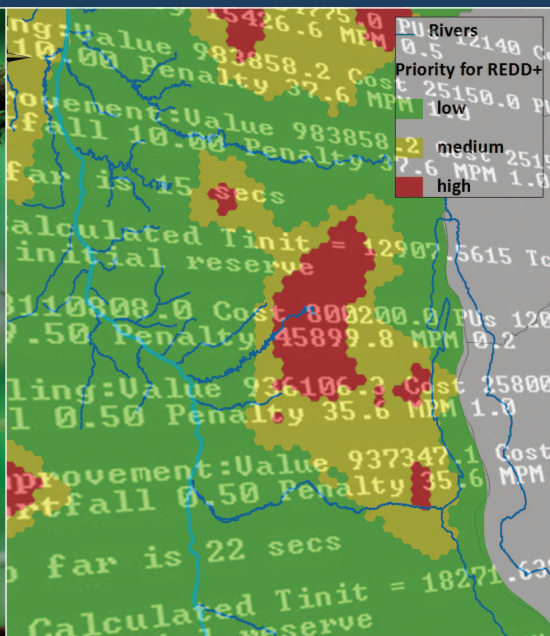




Strengthening benefits from REDD+ for biodiversity, ecosystem services and livelihoods

A guide to tools and resources that can help to plan for multiple benefits from REDD+ in Indonesia



UN-REDD
PROGRAMME



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UN-REDD
PROGRAMME



The UN-REDD Programme is the United Nations collaborative initiative on Reducing Emissions from Deforestation and forest Degradation (REDD+) in developing countries. The Programme was launched in 2008 and builds on the convening role and technical expertise of the Food and Agriculture Organization of the United Nations (FAO), the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP). The UN-REDD Programme supports nationally-led REDD+ processes and promotes the informed and meaningful involvement of all stakeholders, including Indigenous Peoples and other forest-dependent communities, in national and international REDD+ implementation.

The United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) is the specialist biodiversity assessment centre of the United Nations Environment Programme (UNEP), the world's foremost intergovernmental environmental organisation. The Centre has been in operation for over 30 years, combining scientific research with practical policy advice.

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Strengthening benefits from REDD+ for biodiversity, ecosystem services and livelihoods

**A guide to tools and resources that can
help to plan for multiple benefits from
REDD+ in Indonesia**

Cordula Epple, Alana Williamson and Julia Thorley



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Landscape mosaic with agriculture and natural forest, Central Sulawesi. © Sunny Reetz, Georg-August-Universität Göttingen



1. Introduction

REDD+¹ is an emerging approach to climate change mitigation that aims to reduce greenhouse gas concentrations in the atmosphere by avoiding emissions from deforestation and forest degradation and maintaining or enhancing forest carbon stocks. Implementing REDD+ thus requires changes to the way in which forests and areas under other land uses are managed. If designed well, REDD+ actions can provide multiple social and environmental benefits in addition to climate change mitigation, such as conservation of biodiversity and ecosystem services and increased livelihood opportunities. Achieving such benefits is important for a variety of reasons, including increased acceptance by different stakeholders, alignment with other policy goals, and meeting the requirements of the social and environmental safeguards for REDD+ that have been agreed under the UNFCCC (see also Section 2.1.3).

However, those who are involved in developing strategies for REDD+ and planning REDD+ actions are often faced with challenging situations due to the wide range of affected stakeholders, the presence of conflicting interests, and limited availability of information on the consequences of specific choices.

A growing and diverse range of tools and documents providing information or guidance is being developed by various organizations in order to assist REDD+ planners and decision-makers. As these materials have been developed with different kinds of problems and decision-making contexts in mind, it can be difficult to identify the ones that are most suitable for answering a specific question.

This document is a guide to some of the tools and resources that can help decision-makers and their advisors to identify the changes to the management of forests and other land that are to be achieved as part of implementing REDD+. Decisions that need to be made can include:

- The selection of the types of actions that should be supported (e.g. forest rehabilitation, improvements to farming methods or introduction of reduced-impact logging);
- The prioritization of locations where these actions should be carried out; or
- The setting of targets for the implementation of each type of action (e.g. size of the area to be covered, percentage of the population to be involved, etc.).

In selecting tools and resources for inclusion in this guide, specific attention has been paid to those which explicitly take account of the multiple values of forests, and which aim to support the design of REDD+

interventions that provide climate change mitigation as well as other social and environmental benefits. The document does not address questions related to the creation of a supportive governance or institutional framework for REDD+, such as legal reforms or the design of a benefit distribution mechanism.

While the guide has mainly been written as an orientation for REDD+ actors in the Indonesian UN-REDD pilot province Central Sulawesi, it is expected that much of its content can be of use in other geographical or political contexts as well, both within and outside of Indonesia.

In order to keep the amount of information manageable, the tools and resources that are listed for each topic are limited to a selection that was considered particularly relevant in the Indonesian context.

2. Important aspects of planning for multiple benefits from REDD+ and related tools and resources

The following sections are structured around a number of questions that decision-makers are likely to face in the development of REDD+ approaches that provide multiple social and environmental benefits (see Box 1 for an overview).

Section 2.1 introduces these questions and points out possible sources of readily available information that can be used to guide decisions at comparatively short notice and without significant amounts of funding. Section 2.2 then lists the tools and resources that can be applied in order to develop a stronger information basis for answering the questions. The tools and resources that are presented range from simple guidance documents and checklists that can be applied with limited effort by an untrained user, to highly sophisticated software that requires specific technical skills, IT equipment, and months of expert staff time to apply. In order to help users to identify items that are suited to their needs, a rough indication of funding and time requirements is given whenever a tool or resource is introduced, by using the following symbols:

- ⌚\$ Low staff time and funding requirements, e.g. application of tool requires less than a week of staff time and involves no additional costs.
- ⌚\$\$\$ Higher staff time and funding requirements, e.g. application of tool requires more than a week of expert staff time and/or software needs to be purchased.

1 The acronym REDD+, as used under the United Nations Framework Convention on Climate Change (UNFCCC), stands for Reducing Emissions from Deforestation and forest Degradation plus conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks.



A more detailed description of each tool or resource, including an explanation of its uses, requirements and limitations, is provided in the annex to this document in the form of a factsheet.

Throughout the document, content that is specific to the Indonesian or Central Sulawesi context is **highlighted in blue**.

2.1 Guiding questions and possible sources of available information

2.1.1 Identifying options for REDD+ action

In order to develop an implementation strategy for REDD+, it is first necessary to identify options for REDD+ action that are suited to address the causes of forest change in the target area. For example, where deforestation is mainly driven by conversion for small-scale agriculture, providing alternative income opportunities or introducing agricultural methods that reduce land demand will be more relevant options than introducing more sustainable forestry methods. Similarly, opportunities for enhancing forest carbon stocks, e.g. through rehabilitation of degraded forest

land or change from destructive forms of logging to certified sustainable forestry practices, vary from one place to another and it is important to identify those that are appropriate to the area.

Questions:

- a) What are the (main) drivers of deforestation and forest degradation in the target area?
- b) What opportunities exist for enhancement of forest carbon stocks?
- c) What can be done to reduce pressures and realize opportunities for carbon stock enhancement, i.e. what are the options for REDD+ action?

Possible sources of information:

REDD+ strategies can often build on a wealth of information created through earlier efforts in forest conservation and restoration and sustainable forest management. Possible starting points for collecting information on drivers of deforestation and forest degradation, as well as on options to address them and improve the condition of the forest, are forest policy documents, summaries of experiences from forest conservation projects or pilot forest carbon projects, scientific literature and expert consultations. Additional information may be gathered from existing statistics of changes in land use and land cover.

Box 1. Typical questions that may need to be answered in order to make an informed decision about REDD+ implementation

- a) What are the (main) drivers of deforestation and forest degradation in the target area?
- b) What opportunities exist for enhancement of forest carbon stocks?
- c) What can be done to reduce pressures and realize opportunities for carbon stock enhancement, i.e. what are the options for REDD+ action?
- d) What effects could the identified options for REDD+ action have on local livelihoods, ecosystem services and other benefits from forest and non-forest ecosystems?
- e) Which effects are important for which stakeholders?
- f) Do the opportunities and weaknesses of each option depend on where the actions are implemented? If yes, in what way?
- g) Which legal rules and policy or planning documents provide guidance for the management of forests and other lands (including any agreed priorities and targets for carbon and other benefits from REDD+)? What additional criteria or rules should be used for the selection of actions, and of areas where to implement them?
- h) In which parts of the area under consideration can the biggest carbon benefits be obtained from the implementation of different kinds of REDD+ actions (identified above)?
- i) Which parts of the landscape are particularly important for maintaining or enhancing social and environmental benefits, including income from different land use options?
- j) What future developments could influence the benefits obtained from REDD+ actions? How?
- k) How much carbon and other benefits could be obtained (or lost) by implementing a specific set of actions in a specific place? What is the uncertainty of this assessment, taking into account the quality of available data and possible future developments (identified above)?
- l) If priorities and targets for carbon and other benefits have been agreed, what would be a good choice of REDD+ actions and locations to reach those targets?
- m) Are the considered actions in line with the UNFCCC safeguards and other frameworks, including the UN-REDD Social and Environmental Principles?
- n) How can progress towards objectives and/or targets with regard to multiple benefits from REDD+ be measured? What kind of data are already available that can be used?
- o) Can existing data and monitoring programmes be used as a basis for an efficient and affordable monitoring system for multiple benefits?

In the case of Central Sulawesi, an analysis of drivers has already been conducted as part of the development of the provincial REDD+ strategy.

For a list of the types of action that have been carried out or proposed in the context of REDD+ pilot projects and other forest carbon projects in Indonesia, see Annex p. 10. A list of the options for action that are mentioned in Indonesia's National REDD+ Strategy and the draft provincial REDD+ strategy for Central Sulawesi is also provided on p. 10.

A Global Comparative Study on REDD+ that is currently being undertaken by CIFOR (see http://www.cifor.org/publications/pdf_files/brochures/Brochure1001E.pdf) will produce more information on experiences from REDD+ pilot projects, some of which are located in Indonesia.

2.1.2 Identifying the potential effects of REDD+ actions for people and their environment

REDD+ actions can have positive as well as negative effects for people and their environment. By improving the condition of forests, REDD+ can lead for example to enhanced biodiversity conservation, water regulation, soil conservation and provision of non-timber forest products. REDD+ can also lead to social benefits related to jobs and livelihoods. Potential risks associated with REDD+ include intensified use of forests and agricultural areas, leading to negative impacts on the environment (e.g. through afforestation with non-native species or increased use of agrochemicals), or the displacement of deforestation or forest degradation to non-targeted locations. The kind of benefits and risks that are possible depends on the choice of REDD+ actions, as well as on how and where they are implemented (see also Section 2.1.3). Identifying these potential effects and their importance to different stakeholders is an essential basis for decisions.

Questions:

- d) What effects could the identified options for REDD+ action have on local livelihoods, ecosystem services and other benefits from forest and non-forest ecosystems?
- e) Which effects are important for which stakeholders?
- f) Do the opportunities and weaknesses of each option depend on where the actions are implemented? If yes, in what way?

Possible sources of information:

Some information on the way in which certain actions for the management of forests and

other land influence the provision of social and environmental benefits is often available from scientific literature and the reports and monitoring results of relevant projects (including reports on stakeholder consultations).

For Central Sulawesi, a review of the literature addressing effects of the main types of REDD+ actions that are currently under consideration has been carried out under the UN-REDD Programme. The outcomes are described in the report "Options for REDD+ action: what are their effects on forests and people?"². The report includes two overview charts showing the types of effects that can be expected from different actions, as well as the suitability of each action for various types of location.

The report "Safeguarding and enhancing the ecosystem-derived benefits of REDD+" (UN-REDD Programme Multiple Benefits Series 2³) gives a more general overview of the possible effects of different approaches to REDD+ that have been proposed by countries, and how they can be taken into account in the different stages of REDD+ preparation, design and implementation, as well as in monitoring REDD+ outcomes.

2.1.3 Prioritizing REDD+ actions and areas where they should be implemented

Once options for REDD+ action have been identified and an overview of their potential effects on social and environmental benefits has been developed, this knowledge can be used to inform the next step: deciding which actions should be implemented (or supported) where. This is the most complex part of the decision-making process, as it requires spatial information (some of which may not be available in the desired form) and trade-offs will need to be made between different kinds of benefits and the interests of different groups of stakeholders. It is also the step for which the widest range of tools and resources is available (see Section 2.2).

Factors that need to be considered in this part of the decision-making process include the spatial distribution of carbon stocks, pressures on the forest, biodiversity and ecosystem services; as well as existing policy goals, land use plans, development plans of various sectors, legal regulations related to land use and agreed safeguards for REDD+.

The aim of REDD+ safeguards is to promote the benefits and reduce the risks that may arise from REDD+ implementation. Social and environmental safeguards for REDD+ have been adopted at the international level

2, 3. See <http://www.un-redd.org/MultipleBenefitsPublications/tabid/5954/Default.aspx>



under the UNFCCC⁴, and a national framework for their implementation is being developed in Indonesia. To assist countries in the application of safeguards, the UN-REDD Programme has agreed a set of Social and Environmental Principles and Criteria that can serve as a guiding framework for the development and implementation of UN-REDD National Programmes⁵.

In cases where existing policies, plans, regulations or safeguards do not provide sufficient guidance for managing trade-offs between different kinds of benefits (e.g. because they are not detailed enough or conflict with each other), it may be useful to define additional criteria or rules for planning REDD+ actions. This can involve a regionally specific prioritization of benefits. For example, maintenance of biodiversity could be a priority benefit in forest areas with a large number of endemic species that are not yet legally protected, and regulation of water flows could be prioritized in areas where climate change projections indicate an increasing risk of flooding or drought.

Questions:

g) Which legal rules and policy or planning documents provide guidance for the management of forests and other lands (including any agreed priorities and targets for carbon and other benefits from REDD+)? What additional criteria or rules should be used for the selection of actions, and of areas where to implement them?

Possible sources of information:

Legal or policy frameworks that are relevant for REDD+ planning can include sector-specific ones (e.g. forest and environmental policies and laws, agricultural development plans) and cross-sectoral frameworks such as national or regional spatial plans and strategies for poverty reduction or climate change mitigation and adaptation. National or sub-national REDD+ strategies and safeguard frameworks (see also question m) may already include agreed priorities, targets and requirements for carbon and other benefits, or provide guidance on the selection and implementation of REDD+ actions.

A review of legal and policy frameworks that are relevant to the implementation of REDD+ in Central Sulawesi has been carried out under the UN-REDD Programme⁶.

Where necessary, the definition of additional criteria for the selection of REDD+ actions and

implementation areas should involve appropriate forms of participation. An indication of the types of criteria that could be relevant may be available from reports of initial stakeholder consultations on REDD+.

h) In which parts of the area under consideration can the biggest carbon benefits be obtained from the implementation of different kinds of REDD+ actions (identified as described above)?

Possible sources of information:

An initial approximation of possible carbon benefits can be obtained by combining information on current carbon stocks, land use and land use trends in the area in question with information on the average carbon stocks that are found under possible alternative land uses (e.g. agriculture, timber plantations or naturally regenerated forest). Some of this information may already be available from work carried out as part of REDD+ readiness preparations, National Greenhouse Gas Inventories and National Forest Inventories.

Maps of recent carbon stocks and deforestation trends in Central Sulawesi have been produced under the UN-REDD Programme⁷. The Programme has also supported the collection of improved Forest Inventory data and the development of default values of carbon stocks for different forest types.

i) Which parts of the landscape are particularly important for maintaining or enhancing social and environmental benefits, including income from different land use options?

Possible sources of information:

Spatial information related to social and environmental benefits may be available from a range of sources, including government agencies, research institutions and national and international NGOs.

Maps showing a number of factors that are relevant for social and environmental benefits (such as areas important for erosion control or biodiversity conservation and areas of high population density) have been developed for Central Sulawesi under the UN-REDD Programme.⁸

j) What future developments could influence the benefits obtained from REDD+ actions? How?

4. See <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf>, p. 12 ff.

5. See http://www.un-redd.org/multiple_benefits_sepc/tabid/54130/default.aspx and http://www.unredd.net/index.php?option=com_docman&task=doc_download&gid=6985&Itemid=53

6. See the report "Cross-Sectoral Analysis of Policy and Legislative Frameworks that are Relevant to REDD+ Implementation in Central Sulawesi, Indonesia", available at: <http://www.un-redd.org/MultipleBenefitsPublications/tabid/5954/Default.aspx>

7, 8. See the report "Using spatial information to promote multiple benefits from REDD+ in Indonesia – A compendium of maps for Central Sulawesi Province", available at: <http://www.un-redd.org/MultipleBenefitsPublications/tabid/5954/Default.aspx>

Possible sources of information:

Depending on the methods applied for the determination of Reference Emissions Levels, spatially explicit scenarios of future land use and an assessment of likely socio-economic trends may be available from this process. Other sources of relevant information may include global or national-level land use and development scenarios developed by various research institutions, as well as climate change adaptation strategies (for an assessment of likely climatic developments and their impacts) or development strategies (for an assessment of socio-economic trends and information on relevant government policies).

Work on the development of a Reference Emissions Level for Central Sulawesi under the UN-REDD Programme has included both analyses of historic data and forward-looking approaches that take into account land use trends and current planning frameworks⁹.

- k) How much carbon and other benefits could be obtained (or lost) by implementing a specific set of actions in a specific place? What is the uncertainty of this assessment, taking into account the quality of available data and possible future developments (identified as described above)?

Possible sources of information:

Qualitative or semi-quantitative assessments of potential benefits can be made by using the information on impacts of land use changes on carbon stocks (as described under question h), on areas that are particularly important for social and environmental benefits (as described under question i), on the possible social and environmental effects of different options for REDD+ action (as described under questions d–f), and on possible future developments that could have an impact on REDD+ (as described under question j). For a fully quantitative assessment, application of software-based tools is usually required (see Section 2.2). In any case, an evaluation of the uncertainty of the assessment should be included.

- l) If priorities and targets for carbon and other benefits have been agreed, what would be a good choice of REDD+ actions and locations to reach those targets?

Possible sources of information:

A qualitative or semi-quantitative comparison of options for the choice and location of REDD+ actions (e.g. grouping options into ones that make a larger or smaller contribution towards the targets) can be

made using the same information as described for question k). To identify options that can be expected to actually meet a specific set of quantitatively defined targets, application of software-based tools is usually required (see Section 2.2).

- m) Are the considered actions in line with the UNFCCC safeguards and other frameworks, including the UN-REDD Social and Environmental Principles?

Possible sources of information:

Guidance on the application of the UN-REDD Social and Environmental Principles is available from the UN-REDD website¹⁰.

For the Indonesian national framework for the implementation of safeguards, a set of indicators has been developed and is currently under review¹¹.

2.1.4 Developing an approach for monitoring the effects of REDD+ implementation on multiple benefits

Monitoring whether objectives and targets are being met can be one of the most crucial steps in the implementation of a REDD+ strategy, and the approach to monitoring should be decided on as part of the planning process. This applies to the monitoring of achieved carbon benefits as well as to the monitoring of other social and environmental impacts.

Under the UNFCCC, countries are requested to develop a system that provides information on how the UNFCCC safeguards are being addressed and respected in their REDD+ activities. Important synergies are possible between the collection of information that can feed into such a system and the monitoring of multiple benefits from REDD+.

Questions:

- n) How can progress towards objectives and/or targets with regard to multiple benefits from REDD+ be measured? What kind of data are already available that can be used?
- o) Can existing data and monitoring programmes be used as a basis for an efficient and affordable monitoring system for multiple benefits?

Possible sources of information:

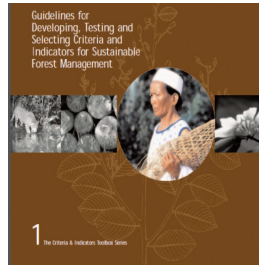
Useful overviews of available data may have been collected in the context of monitoring efforts undertaken to inform national forest, development and environmental policy, or for the purpose of reporting to international environmental agreements. Datasets that have been identified under question

9. More information on this work is available from: <http://un-redd.or.id/>

10. See http://www.un-redd.org/multiple_benefits_sepc/tabid/54130/default.aspx

11. See <http://forda-mof.org/files/Pengembangan%20PRISA1%20ComFoR.pdf>



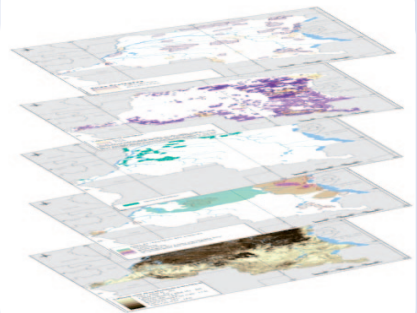
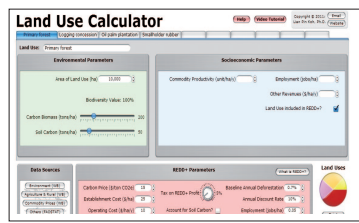
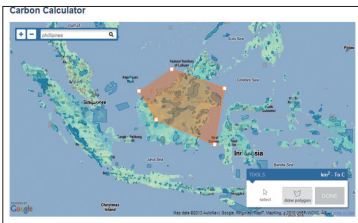
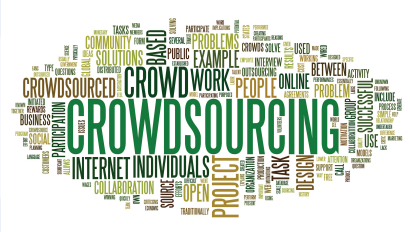


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Time passed so far is 0 secs
Run 2 Using Calculated Tinit = 28499.6846 Tcool = 0.99854272
Creating the initial reserve
Init: Value 23259845.5 Cost 889795.0 PUs 12148 Connection 22437643
Shortfall 374.08 Penalty 15426.6 RHM 0.5
Iteration Improvement: Value 983858.2 Cost 25158.0 PUs 374 Connection 9
Init 1 Shortfall 18.08 Penalty 37.6 RHM 1.0
Iteration Improvement: Value 983858.2 Cost 25158.0 PUs 374 Connect
Missing 1 Shortfall 18.08 Penalty 37.6 RHM 1.0
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Iteration Improvement: Value 936186.3 Cost 26888.0 PUs 374 Connection 9
Init 1 Shortfall 9.58 Penalty 35.6 RHM 1.0
Iteration Improvement: Value 936186.3 Cost 26888.0 PUs 374 Connect
Missing 1 Shortfall 9.58 Penalty 35.6 RHM 1.0

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Decision-support tools



Decision-support tools can have many forms, ranging from guidance documents and flowcharts to techniques for visualizing decision-relevant information and more or less sophisticated and user-friendly software. **Clockwise from top centre:** Front cover of the CIFOR Criteria and Indicators Toolbox Series: Toolbox 1 © CIFOR 1999; Flowchart from the CCI Toolkit for Site-scale assessment of Ecosystem Services © 2011 CCI and BirdLife International; Crowdsourcing concept captured in words © Rafal Olechowski/Shutterstock.com; Demonstration of spatial data overlays © Lucy Goodman, UNEP-WCMC; Web interface of the Land Use Calculator © Lian Pin Koh; Web interface of the Carbon Calculator © UNEP-WCMC; Running script in Marxan planning software, materials provided by Lucy Goodman UNEP-WCMC; Workshop demonstrating CommunityViz software in use © 2011 Placeways LLC.

i) on areas that are important for multiple benefits may also offer a good starting point.

Some guidance on the development of monitoring systems for multiple benefits from REDD+ has been produced under the UN-REDD Programme¹².

2.2 Tools and resources that can help to provide decision-makers with additional information

In situations where enough time and funding are available for more in-depth analyses, it may be useful to apply some of the tools and resources described in the following to address any significant gaps in knowledge.

Tools and resources that can support the identification of options for REDD+ action (Questions a–c)

- REDD Opportunities Scoping Exercise (see Annex p. 11); this resource provides a methodology for identifying and assessing potential REDD+ actions for implementation at the sub-national level; 🕒💰💰💰
- IDRISI Selva Land Change Modeler (see Annex p. 13); this software-based tool can be used for an analysis of drivers of land cover change in order to inform the selection of REDD+ actions that address these drivers; 🕒💰💰💰

Tools and resources that can help to identify the potential effects of REDD+ actions for people and their environment (Questions d–f)

- CIFOR Methods for a multidisciplinary landscape assessment (see Annex p. 15); this resource can be used to explore local people's priorities with regard to biodiversity and ecosystem services in forest landscapes; information on the preferences and needs of local stakeholders is often crucial for assessing the potential effects of REDD+ actions; 🕒💰💰💰

Tools and resources that can be used to identify legal rules and policy or planning documents that provide guidance for the management of forests and other lands (Question g)

- LUWES (Land Use Planning for Low Emission Development Strategy) framework (see Annex p. 17); this software-assisted methodology includes steps that integrate information from existing development and land use plans as well as legal land designations and land use permits; 🕒💰💰💰

Tools and resources that can be used to identify areas with high potential for carbon benefits (Question h)

- Carbon Calculator (see Annex p. 19); this online tool provides users with initial estimates of carbon values for existing protected areas or any polygon drawn on a global map; 🕒💰
- Exploring Multiple Benefits Mapping Toolbox (see Annex p. 21); this toolbox including methodological guidance can be used to create maps of carbon stocks as well as map overlays and statistics that present the spatial relationships between different relevant parameters, such as current carbon stock, potential carbon stock, land cover and legal status; 🕒💰💰💰
- IDRISI Selva Land Change Modeler (see Annex p. 13); this software-based tool can be used to model land cover change and deforestation scenarios, as well as estimate greenhouse gas (GHG) emission reductions due to REDD project interventions; it also includes a facility for leakage zone assessment; 🕒💰💰💰

Tools and resources that can help to identify parts of the landscape that are particularly important for maintaining or enhancing social and environmental benefits (Question i)

- Exploring Multiple Benefits Mapping Toolbox (see Annex p. 21) this toolbox including methodological guidance can be used to create map overlays showing different parameters that determine the importance of an area for social and environmental benefits, such as poverty distribution, erosion risk, water yield or biodiversity; 🕒💰💰💰
- CCI Toolkit for Site-scale Assessment of Ecosystem Services (see Annex p. 23); this resource provides practical guidance on how to measure and monitor a number of ecosystem services at the scale of a project site or community area; 🕒💰💰💰
- High Conservation Value Forest Toolkit (see Annex p. 25); this resource offers practical guidance on identifying High Conservation Value Forests; 🕒💰💰💰
- Conservation International Rapid Assessment Programme Toolkit (see Annex p. 27); this online resource provides information and guidance for planning, designing, and implementing rapid biodiversity surveys; 🕒💰💰💰
- CIFOR Methods for a multidisciplinary landscape assessment (see Annex p. 35); this resource can be used to explore the distribution of biodiversity and ecosystem services in forest landscapes based on local people's perception and traditional knowledge; 🕒💰💰💰
- InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs, see Annex p. 29); this software-based tool can be used to map and value ecosystem services; 🕒💰💰💰
- ARIES (Artificial Intelligence for Ecosystem Services, see Annex p. 31); this is another example of a

12. See Multiple Benefits Series 3, 6 and 9, available from the UN-REDD website at: <http://www.un-redd.org/MultipleBenefitsPublications/tabid/5954/Default.aspx>

software-based tool that can be used to map and value ecosystem services; 🕒\$\$\$\$

With regard to socio-economic benefits, there is also a range of well-established methods for Rapid Rural Appraisal that can be used to gather information. See for example <http://www.fao.org/docrep/W3241E/w3241e09.htm> and <http://www.bridge.ids.ac.uk/reports/bb1c.pdf> for more information.

Tools and resources that can help to identify future developments that could influence the benefits that can be obtained from REDD+ actions (Question j)

- Scenarios for Sustainability Software Toolkit (see Annex p. 33); this collection of software-based tools and other resources can support the different steps of a scenario-building exercise, starting from the development of a narrative and ending with the selection of indicators; 🕒\$\$\$\$
- CIFOR/ASB/ICRAF Field Guide to the Future (see Annex p. 15); this manual can be used to guide the application of scenario-based planning methods in communities who depend on natural resources; 🕒\$\$\$\$
- IDRISI Selva Land Change Modeler (see Annex p. 13); this software-based tool can be used to model land cover change and deforestation scenarios under different assumptions; 🕒\$\$\$\$
- FALLOW (Forest, Agroforest, Low-value Landscape or Wasteland?, see Annex p. 37); this software-based tool can be used to support scenario studies of future land use developments; 🕒\$\$\$\$
- Dyna-CLUE ('Dynamic Conversion of Land Use and its Effects' Model, see Annex p. 39); this software-based tool can be used to simulate future land use change in small regions at fine resolution; 🕒\$\$\$\$
- GLOBIOM (Global Biosphere Management Model, see Annex p. 41); this global land use model can be used to project trends in future agriculture, forestry and bioenergy commodity prices and their impact on the relationship between different land uses; 🕒\$\$\$\$

Tools and resources that can be used to analyse the impacts of a defined set of actions on carbon and other benefits (Question k)

- Spatially Explicit Scenario Analysis for Indonesia's Forest Moratorium (see Annex p. 43); this web-based application has been specifically designed to illustrate the environmental and socio-economic implications and trade-offs of different scenarios for the implementation of Indonesia's forest moratorium in Kalimantan; 🕒\$
- Species Extinction Calculator (see Annex p. 45); this web-based application uses a mathematical model to estimate the probability of species extinctions linked to a certain percentage of forest cover loss; 🕒\$

- Land Use Calculator (see Annex p. 47); this web-based application provides a rough assessment of the effects that dedicating certain percentages of land to different land uses will have on biodiversity, carbon stocks, emissions, financial returns (Net Present Value, NPV) and employment, based on default values; 🕒\$
- REDD Opportunities Scoping Exercise (see Annex p. 11); this resource includes a methodology for assessing the emissions reduction potential of different REDD+ actions; 🕒\$\$\$\$
- InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs, see Annex p. 29); this software-based tool can be used to map and value ecosystem services and assess impacts of changes in land use on them; 🕒\$\$\$\$
- ARIES (Artificial Intelligence for Ecosystem Services, see Annex p. 31); this software-based tool can also be used to map and value ecosystem services and assess impacts of changes in land use on them; 🕒\$\$\$\$
- IDRISI Selva Land Change Modeler (see Annex p. 13); this software-based tool can be used to assess impacts of the modelled land use developments on ecosystem services, habitats and biodiversity; 🕒\$\$\$\$
- FALLOW (Forest, Agroforest, Low-value Landscape or Wasteland?, see Annex p. 37); this software-based tool can be used to assess impacts of the modelled land use developments on watershed functions, biodiversity indicators and carbon stocks; 🕒\$\$\$\$
- REDD Abacus SP Software (see Annex p. 49); this software-based tool can be used to analyze the opportunity cost of land use changes in a landscape or area within a defined period of time and derive supply cost curves of carbon emission reductions; 🕒\$\$\$\$
- World Bank Workbook for estimating opportunity cost of REDD+ (see Annex p. 51); this Excel-based worksheet can be used to derive estimates for the opportunity costs of REDD+ within a certain region; 🕒\$\$\$\$

Tools and resources that can be used to select REDD+ actions and locations that are in line with agreed priorities and targets for carbon and other benefits (Question l)

- Marxan (see Annex p. 53); this decision-support software can be used to develop a selection of planning units where application of a specific land use could achieve set targets related to social and environmental benefits at minimal costs and trade-offs with other targets; 🕒\$\$\$\$
- CLUZ (Conservation Land Use Zoning software, see Annex p. 55); this GIS-based software tool can be used in combination with Marxan to interactively modify Marxan outputs and assess



the performance of the resulting land use plans against the specified targets; 🕒\$\$\$\$

- CommunityViz (see Annex p. 57); this GIS-based decision-support tool can visualize some of the social and environmental implications of different land use choices and is designed for use in a group consultation setting; 🕒\$\$\$\$
- Zonation (see Annex p. 59); this software-based tool can be used to identify areas whose conservation would make a particularly large contribution to maintaining biodiversity; it can include connectivity aspects; 🕒\$\$\$\$

There is also a range of well-established methods for Multi-criteria Analysis that can be used to assess the performance of different options against agreed targets. See for example http://unfccc.int/files/adaptation/methodologies_for/vulnerability_and_adaptation/application/pdf/multicriteria_analysis_mca_pdf.pdf, <http://www.cifor.org/acm/methods/mca.html> and <http://www.defra.gov.uk/publications/2011/12/22/pb13695-paper5/> for more information.

Tools and resources that can help to assess the compatibility of considered actions with the UNFCCC safeguards and other frameworks, including the UN-REDD Social and Environmental Principles (Question m)

- Benefit and Risks Tool (see Annex p. 61); this resource guides the user through a sequence of questions that are intended to help assess potential risks and benefits of a national REDD+ programme in relation to the UN-REDD Social and Environmental Principles and Criteria; 🕒\$
- Social and Biodiversity Impact Assessment Manual for REDD+ Projects (see Annex p. 63); this resource suggests a process for impact assessment and describes specific methods and tools for assessing social impacts of a REDD+ project as well as impacts on biodiversity; 🕒\$\$\$\$
- CBD Guidelines on Biodiversity-inclusive Impact Assessment (see Annex p. 65); this resource provides detailed guidance for considering biodiversity in project-level and strategic-level impact assessments; 🕒\$\$\$\$

Tools and resources that can be used to develop an approach for monitoring the effects of REDD+ implementation on multiple benefits (Questions n and o)

- CBD Lessons Learned Report on Developing Ecosystem Service Indicators (see Annex p. 67); this resource provides some guidance for the development and use of indicators to monitor and measure ecosystem services at scales that are relevant for policy and management; 🕒\$\$\$\$

- Biodiversity Indicators Partnership Guidance for National Biodiversity Indicator Development and Use (see Annex p. 69); this resource provides guidance for the development of biodiversity indicators at the national level; 🕒\$\$\$\$
- CIFOR Criteria and Indicators Toolbox series (see Annex p. 71); this series of nine tools and resources is aimed to help users develop and assess criteria and indicators of sustainable and equitable forest management; 🕒\$\$\$\$
- CCI Toolkit for Site-scale Assessment of Ecosystem Services (see Annex p. 23); this resource provides practical guidance on how to measure and monitor a number of ecosystem services at the scale of a project site or community area; 🕒\$\$\$\$
- Social and Biodiversity Impact Assessment Manual for REDD+ Projects (see Annex p. 63); this resource includes guidance on the development of a monitoring methodology; 🕒\$\$\$\$

3. Choosing the right tool in a given context

When selecting tools and resources for application in a decision-making process, a number of questions may be relevant:

1. Can the priorities and targets for multiple benefits that result from relevant policies and stakeholder interests be appropriately reflected in application of the tool/resource? (*Some tools allow for weighting of criteria or application of user-defined criteria, while others are less flexible.*)
2. Can all criteria and options for action that are relevant to the decision be covered by the tool/resource? If not, can the tool/resource be combined with others? (*E.g. in some cases it may be possible to combine tools and resources that have been designed to look at different social or environmental impacts of REDD+, or that consider different types of REDD+ activities.*)
3. Is the tool/resource compatible with the spatial scale at which it is to be applied?
4. How much time, expertise, technical capacity and money is needed to apply the tool/resource? For tools: is it necessary to customize the tool for application in the present context?
5. Is the data and information that is available for application of the tool/resource sufficient to achieve meaningful results?
6. Is the tool/resource compatible with the procedural requirements for taking the decision? (*E.g. if stakeholder participation is to form a part of the decision-making process, do all stakeholders have the necessary capacity to interpret and comment on the results of applying the tool/resource?*)

For the tools and resources listed in this report, the factsheets provided in the annex are intended to help answer some of these questions.

It is important to keep in mind that no tool can reflect the full complexity of the real-life situations faced by decision-makers. Where previous experience with a certain type of policy or project is low, or where the data basis for decisions is weak, there may be a strong case for basing decisions on the application of simple and transparent tools that can be adjusted in line with newly arising findings or concerns.

In practice it may often be advisable to use a combination of tools. For example, application of a GIS-based tool for the identification of priority areas for certain types of actions could be combined with a multi-criteria scorecard approach or a decision-tree for the approval of project proposals to take account of factors for which spatial information is not (currently) available, such as clarity of the land tenure situation or previous experience of project proponents with the proposed kind of actions.

4. Some relevant links

There are a number of tools databases and websites that can provide further useful information for planning REDD+ actions. Some examples are provided below:

List of Forest Carbon Tools and Resources developed by Forest Carbon Asia: <http://www.forestcarbonasia.org/publications/tools/>

Tools Database of the Ecosystem-based Management Tools Network: <http://ebmtoolsdatabase.org/tools>

REDD+ and Agriculture Web Resource developed by the Prince's Rainforest Project: <http://www.pcfisu.org/redd-and-agriculture-web-resource>

UN-REDD web page on tools for planning for multiple benefits from REDD+: linked from <http://www.un-redd.org/tabid/1016/Default.aspx>

5. Annex

List of possible REDD+ actions that have been carried out or proposed in the context of REDD+ pilot projects and other forest carbon projects in Indonesia (Source: literature review carried out by UNEP-WCMC)

- Expansion of protection forest and conservation areas
- Enforcement of forest laws
- Fire control
- Sustainable forest management
 - Enrichment planting
 - Reduced impact logging
 - Forest certification
- Forest rehabilitation
- Natural and assisted natural regeneration
- Rewetting of drained peatland
- Timber plantations and oil palm plantations on non-forest land and degraded soils
- Agroforestry
- Promoting non-timber forest products through sustainable harvesting, management and marketing support
- Support to alternative livelihoods: sustainable enhancement of agricultural productivity, sustainable fisheries, ecotourism, bee and ant heap farming, cultivation of medicinal plants, traditional handicrafts
- Provision of alternative fuels and increasing fuel efficiency for stoves and lighting.

List of possible REDD+ actions that are mentioned in Indonesia's National REDD+ Strategy and the draft provincial REDD+ Strategy for Central Sulawesi

- Expansion of protection forest and conservation areas
- Improve land use planning to protect areas with high peat content and high conservation values
- Land swaps between forest area and APL
- Sustainable forest management
 - Decreasing allowable cut
 - Implementation of the silviculture systems SILIN and TPTI
 - Reduced impact logging
 - Forest certification
- Stricter monitoring of the utilization of production forest
- Controlling illegal logging
- Fire control
- Watershed rehabilitation
- Forest restoration and rehabilitation of critical land
- Reclamation of former mining areas
- Natural and assisted natural regeneration
- Development of community plantations
- Village forest and community forest management
- *Agathis* cultivation
- Agricultural intensification.



The REDD Opportunities Scoping Exercise (ROSE)

http://www.forest-trends.org/documents/files/doc_2431.pdf

SCALE:

**Sub-national
to National**



ACCESS:

**OPEN
COMMERCIAL
RESTRICTED**

SOFTWARE-BASED:

**YES
NO**

LANGUAGE:

EN

What is ROSE?

The REDD opportunities scoping exercise (ROSE) is a methodology, based on an ‘expert workshop’, for classifying and prioritizing potential sub-national REDD+ activities and for assessing critical constraints to project development, especially those associated with the legal, political, and institutional framework for carbon finance. The ROSE tool is therefore relevant to the development of REDD+ at both the sub-national and national levels.

What can it be used for in the context of REDD+?

At the national level, ROSE assessments provide a rapid qualitative analysis, based on expert opinion, to identify key emissions abatement opportunities across different forest contexts. At the sub-national level, ROSE is a pre-cursor to the process of pre-feasibility and feasibility analysis.

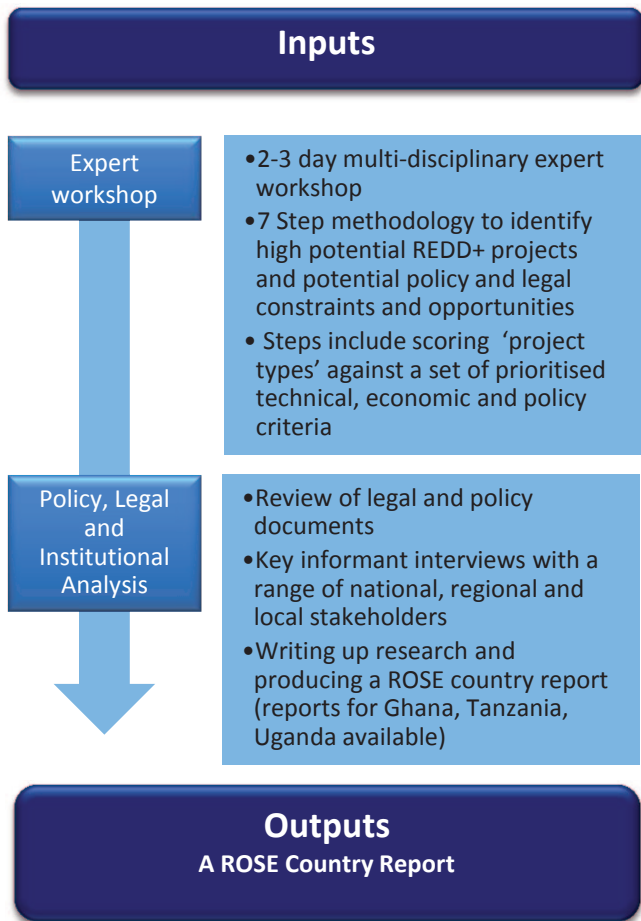
ROSE assessments can support a variety of processes towards ‘REDD+ Readiness’ including (i) development of an R-PP for FCPF funding; (ii) development of a balanced portfolio of sub-national activities and a balanced REDD+ strategy (iii) quantitative assessments of emissions reductions potential, and (iv) development of demonstration activities illustrative of key project types.

What can it not be used for?

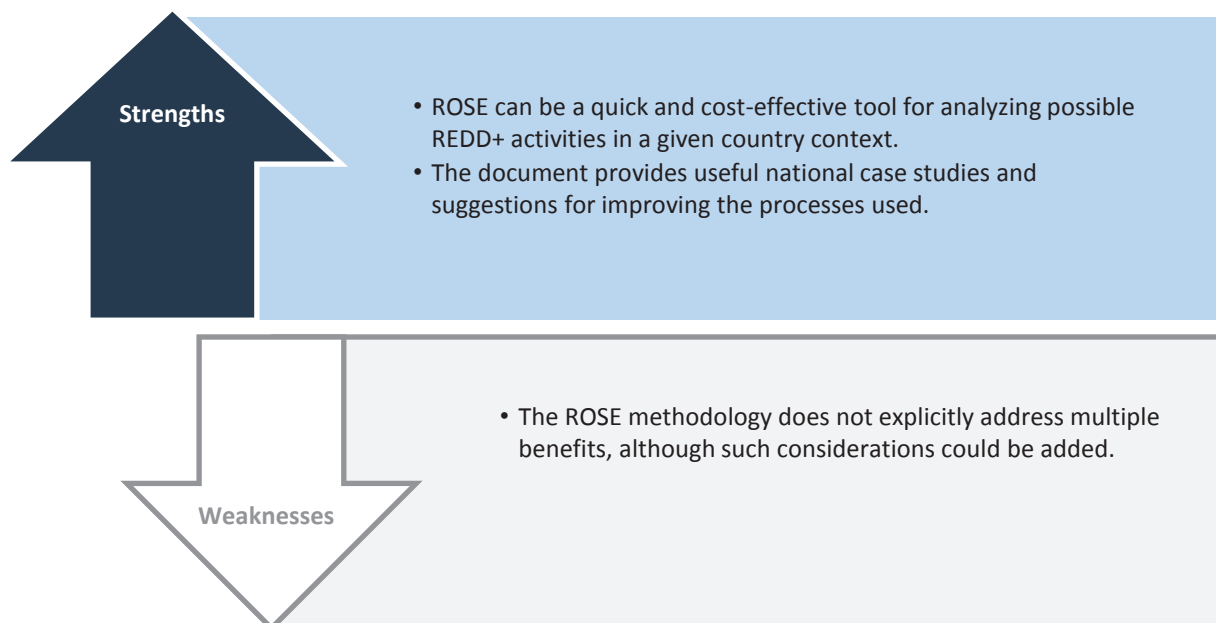
ROSE does not involve a representative stakeholder process. It can therefore only be used to inform a policy process but not to form part of it. Nor can it be used for feasibility analysis – for this see: http://forest-trends.org/publications/building_forest_carbon_projects/

REDD+ activities that can be addressed

✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of ROSE?



Expertise?

The ROSE process is aimed at policy makers. Some legal expertise and forest sector knowledge are necessary for the second 'analysis' phase of the process.



Time requirements?

Learning to use the tool: < 1 day
Application of the tool: 2–3 months

Further resources:

ROSE Home Page: http://www.forest-trends.org/publication_details.php?publicationID=2431

Acknowledgements

We would like to thank Dr Michael Richards of Forest Trends for review of this factsheet.

Contact

Climate Change and Biodiversity Programme
UNEP World Conservation Monitoring Centre
Email: climate@unep-wcmc.org
Website: <http://www.un-redd.org/tabid/1016/Default.aspx>



IDRISI Selva Land Change Modeler (LCM)

<http://www.clarklabs.org/products/Land-Change-Modeling-IDRISI.cfm>

SCALE:

**Sub-national
to National**



ACCESS:

~~OPEN~~
**COMMERCIAL
RESTRICTED**

SOFTWARE-BASED:

YES
~~NO~~

LANGUAGE:

EN

What is IDRISI LCM?

IDRISI LCM is a land use planning and decision support software tool that allows for analysis of past land cover change, development of scenarios of future land use change, species distribution modelling, and assessment of land use change impacts on habitats and biodiversity. IDRISI LCM also features tools for REDD+ that can develop deforestation baselines and models of future deforestation for use at a project level.

What can it be used for in the context of REDD+?

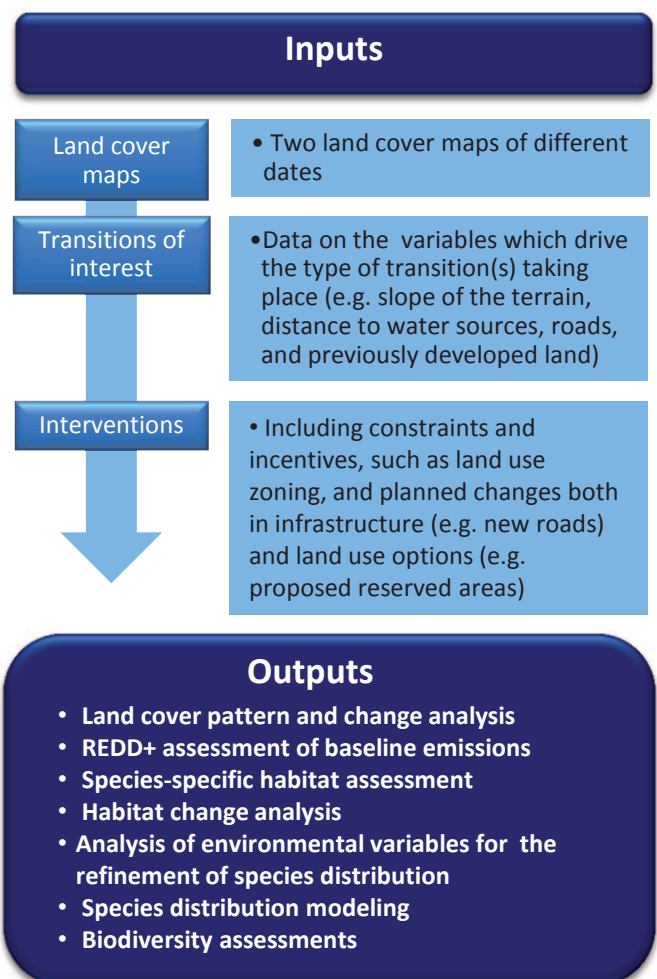
The land cover change analysis can be used to assess the nature of change between two land cover maps of different dates, in order to: (i) understand historical deforestation trends, (ii) identify drivers of land use change, and (iii) model future scenarios. The tool can support REDD+ project planning, and facilitates the estimation of baseline emissions from various carbon pools. It also allows the calculation of deferred emissions and carbon credits. The future land use scenario modeler, combined with the species distribution modeler, could be used to investigate the potential impacts on biodiversity from REDD. LCM also has an interface for MARXAN (see Marxan factsheet).

What can it not be used for?

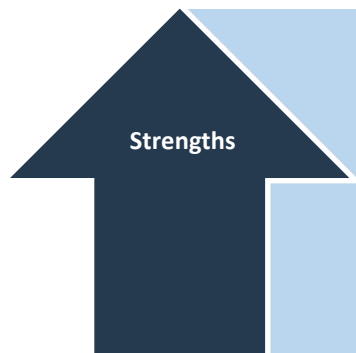
IDRISI LCM cannot be used to display trade-offs between carbon services and other ecosystem services.

REDD+ activities that can be addressed

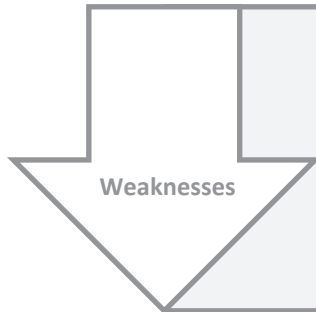
✓	Reducing emissions from deforestation
	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
	Sustainable management of forests
	Enhancement of forest carbon stocks



What are the strengths and weaknesses of IDRISI LCM?



- LCM features a robust tool to simulate deforestation trends.
- LCM takes advantage of IDRISI's suite of Remote Sensing and GIS analytical tools.
- LCM has an integrated interface to other conservation and land use planning software (e.g. Marxan and MaxEnt). LCM is also available separately as an extension to ESRI's ArcGIS product.
- LCM has a full documentation description and tutorials with datasets to facilitate the learning process.



- Preparation of the input files requires good knowledge of IDRISI and/or the ArcGIS interface.
- Data intensive, requires users to acquire comparable cloud free satellite imagery from different time periods.
- Full access to the LCM is not open (although a trial version exists), general users will pay 1,250USD for the IDRISI software, which includes LCM. However, discounted pricing is available for academics and users in developing countries.



Expertise?

To use IDRISI LCM users need to be familiar with IDRISI and/or ArcGIS software



Time requirements?

Learning to use the tool: 1 day

Application of the tool: ca. 5 weeks

Further resources:

IDRISI LCM Home Page: <http://clarklabs.org/resources/upload/LCM-Spotlight.pdf>

IDRISI LCM REDD Baselines: http://clarklabs.org/applications/upload/IDRISI_Focus_Paper_REDD.pdf

IDRISI LCM for ArgGIS: <http://clarklabs.org/applications/upload/Land-Change-Modeler-ArcGIS-Software-Brochure.pdf>

The Land Change Modeler for Ecological Sustainability: <http://clarklabs.org/applications/upload/Land-Change-Modeler-IDRISI-Focus-Paper.pdf>

Species Distribution Modeling in IDRISI's Land Change Modeler:

http://clarklabs.org/about/upload/Focus_Paper_Species.pdf

Video Resources: <http://clarklabs.org/resources/videos.cfm>

Related software and tools:

IDRISI LCM has a facility for conservation planning and reserve design with an interface to Marxan and MaxEnt. Marxan is a widely used conservation planning tool for reserve selection and design (see separate factsheet). MaxEnt is used for species habitat modelling.

Acknowledgements

We would like to thank Stefano Crema at Clark Labs, Clark University, for review of this factsheet.

Contact

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Website: <http://www.un-redd.org/tabid/1016/Default.aspx>



UNEP



WCMC

CIFOR Methods for a multidisciplinary landscape assessment

http://www.cifor.org/mla/download/publication/exploring_bio.pdf

SCALE:
Sub-national 

ACCESS:
OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:
YES
NO

LANGUAGE:
EN 

What is a multidisciplinary landscape assessment?

The technique described in the report combines conventional biophysical descriptions of the landscape with the collection of information on local needs, preferences, knowledge and value systems. It gives guidance on how to create a link between the needs of local communities, the conservation of biodiversity and achieving sustainability at a landscape level. The methods were developed in partnership with indigenous communities in the Malinau watershed in East Kalimantan, and have been applied in several other countries in Asia, Africa and Latin America.

What can it be used for in a REDD+ context?

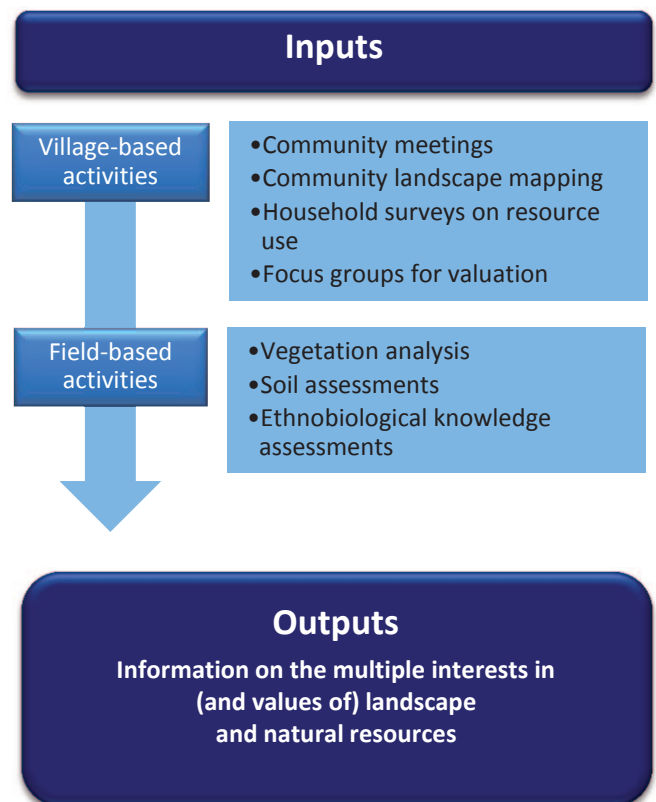
The methods provided can be used as a means to address the multiple interests in (and values of) landscape and natural resources, to identify what is 'important' to local communities and where and how these values may be threatened, and make recommendations about options for land use and policy.

What can it not be used for?

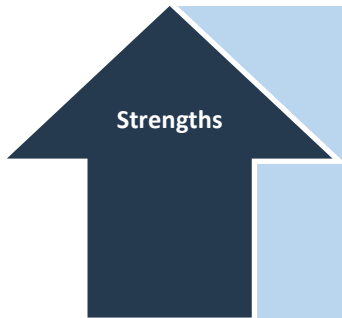
It is not recommended to transfer the protocol of methods directly to other regions, as this is considered context-specific. Rather, the MLA presents a menu of methods that can form the basis for developing context-specific protocols and specific applications for other regions.

REDD+ activities that can be addressed

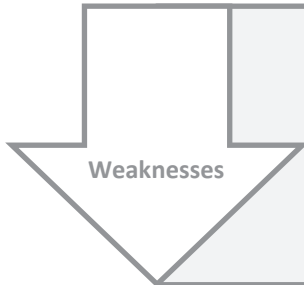
✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of the approach?



- The methods can help to bridge the communication gap between local communities and decision-makers.
- The use of a weighted ranking exercise can provide a measure of relative use-value and thus be developed for non-monetary valuation of resources and landscapes.



- The protocol and details of the methods outlined are location-specific and should be adapted when they are to be used in other settings.



Expertise?

No specialist knowledge required



Time requirements?

Learning to use the tool: < 1 day

Application of the tool: Several months

Further resources:

Methods for a multidisciplinary landscape assessment Home Page: <http://www.cifor.org/online-library/browse/view-publication/publication/1021.html>

Methods: http://www.cifor.org/mla/download/publication/exploring_bio.pdf

References:

1. Sheil, D.; Puri, R.K.; Basuki, I.; van Heist, M.; Saefuddin; Rukmiyati; Sardjono, M.A.; Samsedin, I.; Sidiyasa, K.D.; Chrisandini; Permana, E.; Angi, E.M.; Gatzweiler, F.; Johnson, B.; Wijaya, A. 2003. Exploring biological diversity, environment and local people's perspectives in forest landscapes. Methods for a multidisciplinary landscape assessment. CIFOR, Bogor, Indonesia.
2. Sheil, D., R. Puri, M. Wan, I. Basuki, M. van Heist, N. Liswanti, Rukmiyati, I. Rachmatika & I. Samsedin. 2006. Local people's priorities for biodiversity: examples from the forests of Indonesian Borneo. *Ambio* 15 (1):17-24.

Acknowledgements

We would like to thank Dr Rajindra K. Puri at the University of Kent for review of this factsheet.

Contact

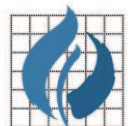
Climate Change and Biodiversity Programme
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Email: climate@unep-wcmc.org

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UNEP



WCMC



LUWES (Land Use Planning for Low Emission Development Strategy)

<http://www.asb.cgiar.org/PDFwebdocs/LUWES%202012%20V1.pdf>

SCALE:
Sub-national



ACCESS:
OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:
YES
NO

LANGUAGE:
EN

What is LUWES?

Land Use Planning for Low Emission Development Strategy (LUWES) is a methodological framework that combines technical and participatory processes in order to assist with the informed negotiation of integrated development plans at the landscape level that can reduce greenhouse gas emissions from land use based activities while still allowing for economic growth and supporting local livelihoods. It also recognizes the impact of land use allocation policies on tenure. LUWES presents a series of steps that starts from an analysis of existing planning documents and the development of a business-as-usual scenario. The process further includes the analysis, discussion and prioritization of different options for land use under REDD+, based on trade-off analysis between economic benefit and emissions reduction. The technical steps are supported by a number of specific tools (including the REDD Abacus SP software for the calculation of opportunity costs, see related factsheet).

What can it be used for in the context of REDD+?

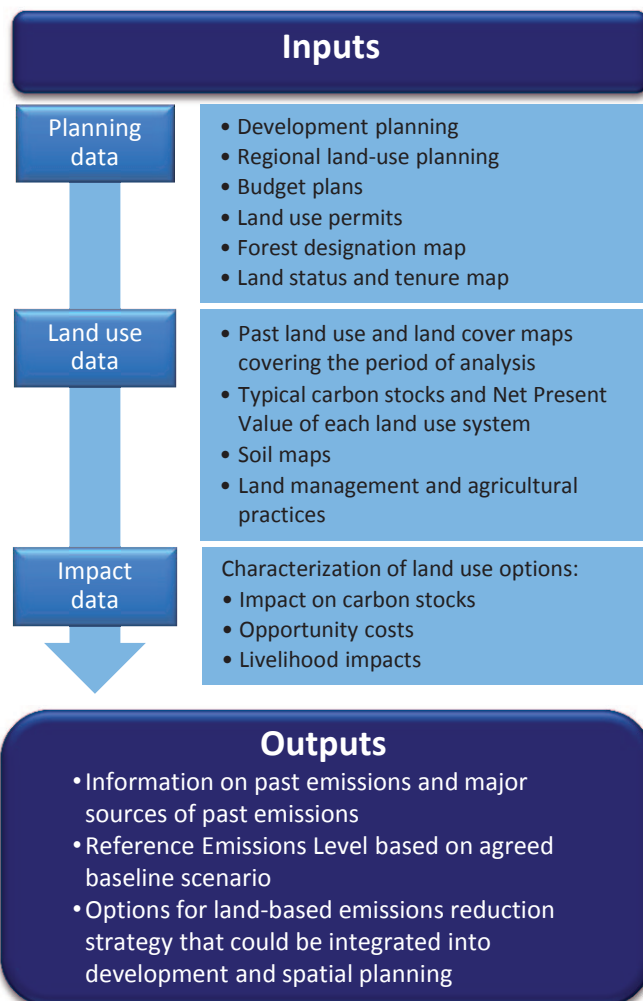
LUWES can support the analysis and negotiation of trade-offs between the interests of different stakeholders and the reduction of emissions when choosing between various options for REDD+ implementation and deciding on a land use plan for sustainable development. It can also help to avoid or reduce conflicts between the development plans of different sectors.

What can it not be used for?

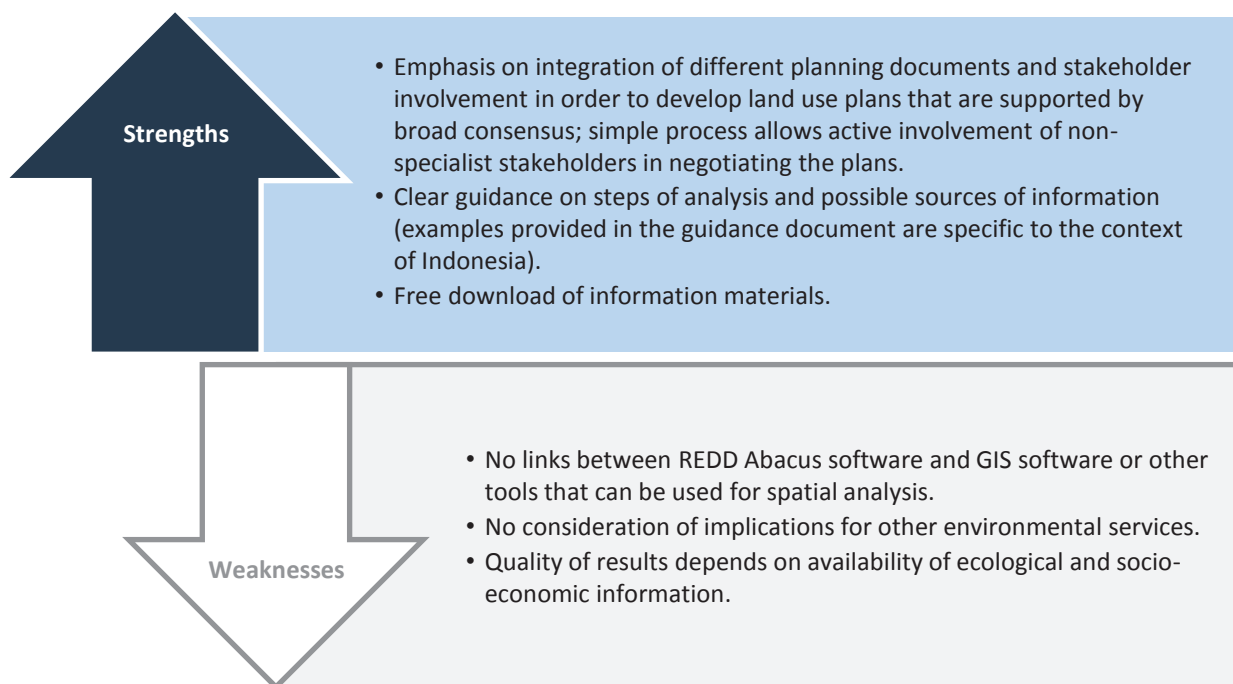
The LUWES framework does not include a link to spatially explicit modelling software that could assist in the development and analysis of land use scenarios. At present, only benefits for climate change mitigation are considered, although there are plans to include assessment of multiple environmental services in the future.

REDD+ activities that can be addressed

✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of LUWES?



Expertise?

Some knowledge on scenario analysis, land use change analysis and background in ecology and economics required to apply the tools



Time requirements?

Learning to use the tool: < 1 week

Application of the tool: Up to several months, depending on local circumstances

Further resources:

LUWES Home Page: <http://www.asb.cgiar.org/research-brief/land-use-planning-low-emission-development-strategy-luwes-case-studies-indonesia>

LUWES: http://www.asb.cgiar.org/PDFwebdocs/LUWES_2012_V1.pdf

REDD Abacus SP Software: <http://www.worldagroforestry.org/sea/abacus>

References:

1. Dewi S, Ekadinata A, Galudra G, Agung P and Johana F. 2011. LUWES: Land use planning for Low Emission Development Strategy. Bogor, Indonesia. World Agroforestry Centre - ICRAF, SEA, Regional Office. 47 p.

Acknowledgements

We would like to thank Dr Sonya Dewi at the Center for International Forestry Research for review of this factsheet.

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Website: <http://www.un-redd.org/tabid/1016/Default.aspx>





Carbon Calculator

<http://www.carbon-biodiversity.net/Interactive/CarbonCalculator>

SCALE:
Sub-national
to International



ACCESS:
OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:
YES
NO

LANGUAGE:
EN



What is the Carbon Calculator?

This tool provides users with initial estimates of carbon stocks for existing protected areas or any polygon drawn on a global map. Carbon estimates are based on a global map of carbon storage, which includes above and below ground biomass carbon stocks, as well as carbon stored in soils down to 1 metre depth. The tool uses the most up to date version of the World Database on Protected Areas (WDPA), which is available online at <http://www.protectedplanet.net>

What can it be used for in a REDD+ context?

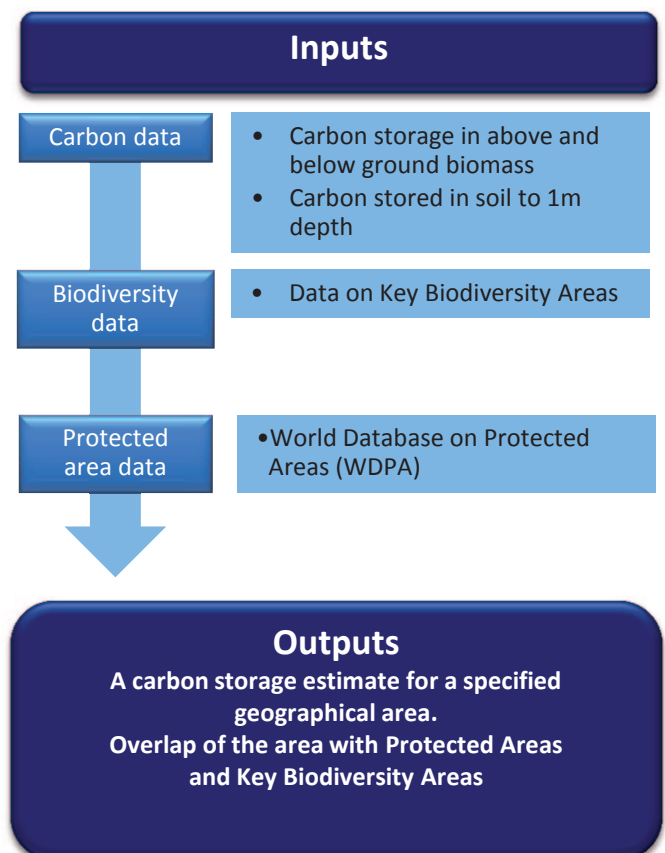
The tool allows the user to select a geographical area, by drawing a polygon on an interactive world map. The calculator then provides an estimate of the number of tonnes of carbon stored in the selected area. It also calculates the percentage of the selected area that lies within existing Protected Areas and Key Biodiversity Areas.

What can it not be used for?

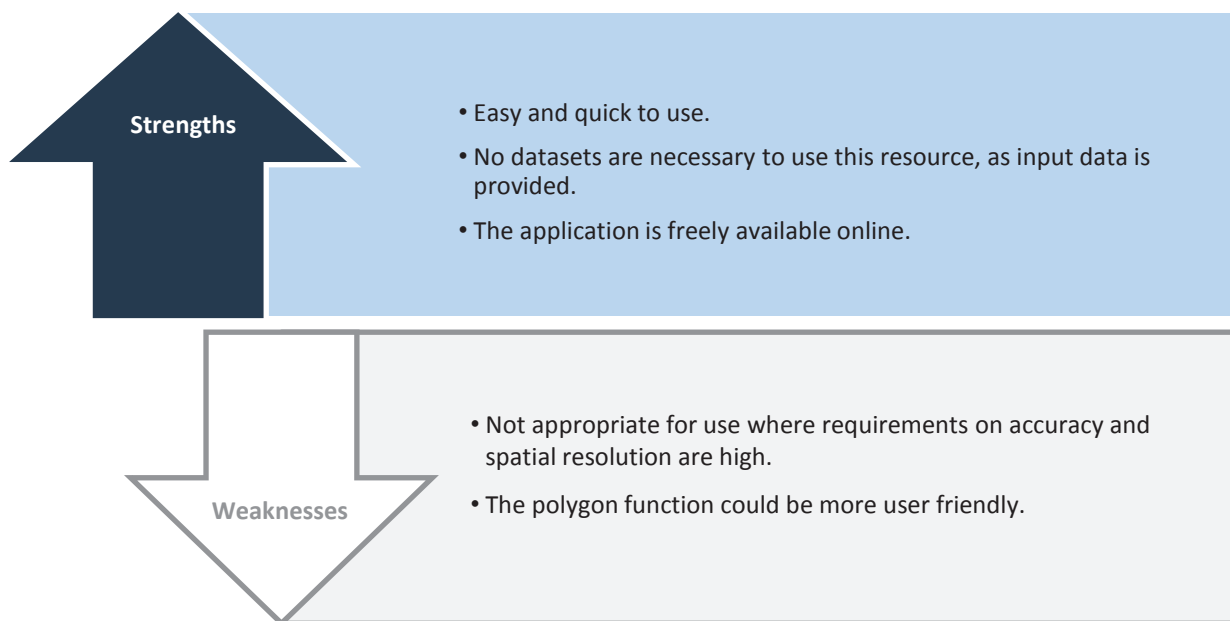
The carbon storage estimate produced by the tool can currently only be linked to Key Biodiversity Areas. The tool does not include information on other areas important for ecosystem services and biodiversity. Due to limitations in the spatial resolution and accuracy of globally available carbon stock datasets, the tool can not be used to provide the kind of precise figures that are needed for carbon accounting in a project context.

REDD+ activities that can be addressed

✓	Reducing emissions from deforestation
	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
	Sustainable management of forests
	Enhancement of forest carbon stocks



What are the strengths and weaknesses of the Carbon Calculator?



Expertise?

No specialist knowledge required



Time requirements?

Learning to use the tool: < 1 hour
Application of the tool: < 1 hour

Further resources:

Home Page: <http://www.carbon-biodiversity.net/Interactive/CarbonCalculator>

User guide: <http://www.carbon-biodiversity.net/Interactive/CarbonCalculatorNotes>

Note: an updated version of the tool integrating further datasets will become available in the first half of 2013.

References:

1. Scharlemann, J.P.W., Hiederer, R., Kapos, V., Ravilious, C. 2009. Updated global carbon map. UNEP-WCMC & EU-JRC, Cambridge, UK.
2. Ruesch, Aaron, and Holly K. Gibbs. 2008. New IPCC Tier-1 Global Biomass Carbon Map For the Year 2000.
3. Scharlemann, J.P.W., Hiederer, R., Kapos, V. (in prep.). Global map of terrestrial soil organic carbon stocks. UNEP-WCMC & EU-JRC, Cambridge, UK.

Acknowledgements

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Exploring Multiple Benefits Mapping Toolbox

http://www.un-redd.org/Multiple_Benefits_GIS_Mapping_Toolbox/tabid/79198/Default.aspx

SCALE:

Sub-national
to National



ACCESS:

OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:

YES
NO

LANGUAGE:

EN

What is the Multiple Benefits Mapping Toolbox?

This customised ArcGIS toolbox (available for ArcGIS 9.3.1 and ArcGIS 10) has been developed for spatial analyses that can support the achievement of multiple benefits from REDD+. It provides both novice and experienced GIS users with a series of analytical tools to help identify, map and understand the spatial relationship between carbon stocks, ecosystem services, biodiversity, land use, pressures on natural resources and other factors that are relevant to the planning of REDD+ implementation.

What can it be used for in the context of REDD+?

- Outputs can support REDD+ decision making; e.g.
- Illustrate where REDD+ could secure biodiversity and other ecosystem services in addition to maintaining carbon stocks;
 - Present the distribution of carbon stocks in relation to land use plans and management units;
 - Highlight where areas of importance for social and environmental benefits may be under pressure (e.g. from deforestation);
 - Identify areas of importance for biodiversity or ecosystem services that are unlikely to directly benefit from REDD+.

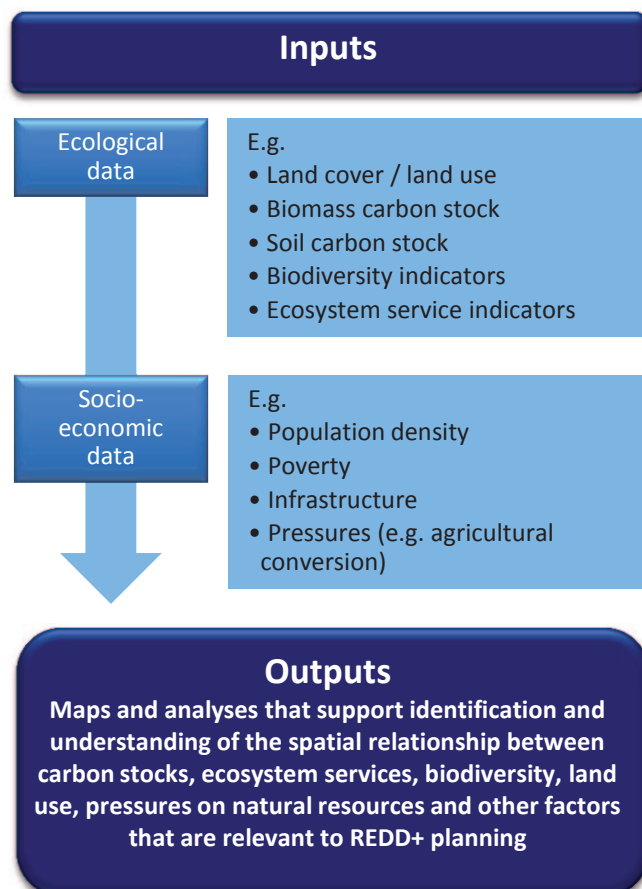
These analyses are dependent on suitable data being available for the priorities, questions and scope of the work.

What can it not be used for?

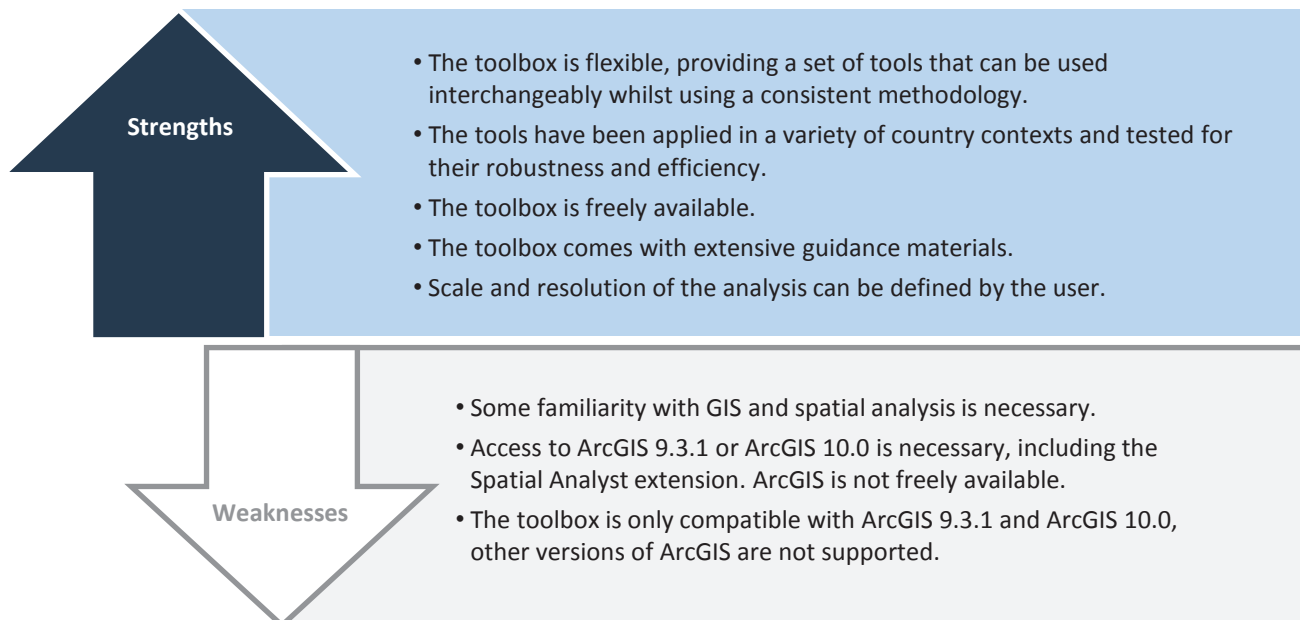
The Toolbox can only assist with the combination and analysis of existing datasets, not with the collection of new data. The identification of relevant questions for REDD+ planning and potential sources of data is a precondition for application of the Toolbox.

REDD+ activities that can be addressed

✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of the Toolbox?



Expertise?

Some familiarity with GIS and spatial analysis is necessary



Time requirements?

Learning to use the tool: < 1 week for a user who is familiar with GIS software
Application of the tool: Depending on the quality and resolution of input data and the amount of processing required; normally < 1 day per map

Any additional software requirements?

To use the customised toolbox it is necessary to have ArcGIS software installed, including the Spatial Analyst extension. The ArcGIS toolbox has been built in ArcGIS Version 9.3.1 and 10.0. Recognising that not every GIS user has access to ArcGIS, the manual aims to provide enough information on the principles, concepts and technical details so that similar procedures can be undertaken in other GIS platforms.

Further resources:

Home Page: http://www.un-redd.org/Multiple_Benefits_GIS_Mapping_Toolbox/tabid/79198/Default.aspx

Toolbox: http://www.unredd.net/index.php?option=com_docman&task=doc_download&gid=6434&Itemid=53

Manual: http://www.unredd.net/index.php?option=com_docman&task=doc_download&gid=6432&Itemid=53

References:

1. Ravilious, C., Bertzky, M., Miles, L. 2011. Identifying and mapping the biodiversity and ecosystem-based multiple benefits of REDD+. A manual for the ExploringMultipleBenefits tool. *Multiple Benefits Series 8. Prepared on behalf of the UN-REDD Programme. UNEP World Conservation Monitoring Centre, Cambridge, UK.*

Acknowledgements

We would like to thank Lucy Goodman at UNEP-WCMC for review of this factsheet.

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Website: <http://www.un-redd.org/tabid/1016/Default.aspx>



CCI Toolkit for Site-scale Assessment of Ecosystem Services

<http://www.unep-wcmc.org/medialibrary/2011/10/26/9688cf08/MeasuringMonitoringEcosystemServicesattheSiteScale.pdf>

SCALE:
Site-level

ACCESS:
OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:
YES
NO

LANGUAGE:
EN

What is the CCI Toolkit for Site-Scale Ecosystem Service Assessment?

The toolkit provides practical guidance on how to measure and monitor a number of ecosystem services at the site scale with limited input of time and resources, and how to assess the potential impacts of changes in land use on these services. It helps the user to decide which services to include in the assessment, what methods to use, and how to communicate the results. The proposed methods are designed to provide scientifically robust initial results that can serve as an orientation for decision-makers and help to identify areas where more detailed studies would be useful.

What can it be used for in the context of REDD+?

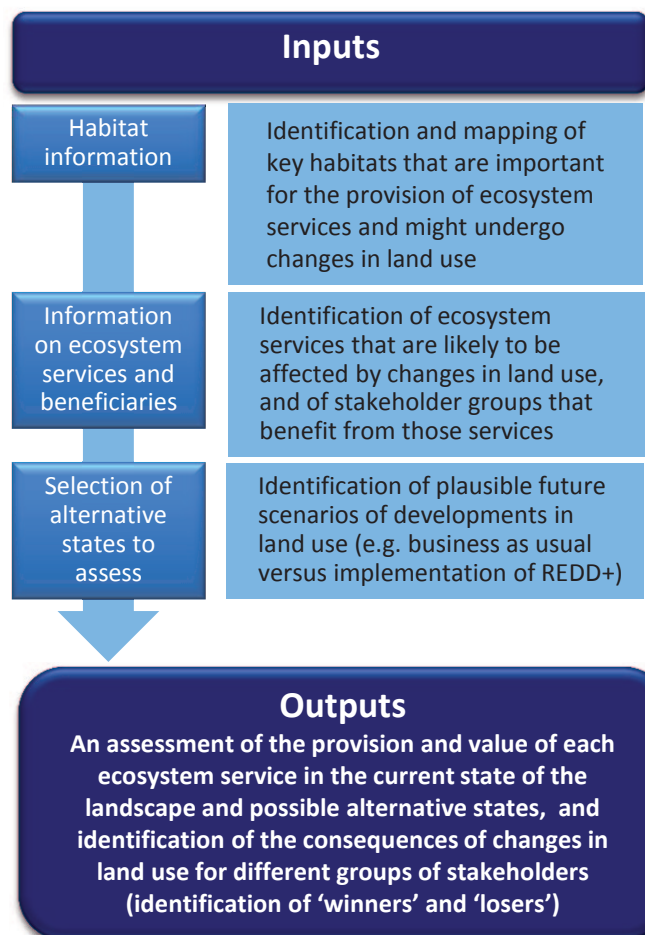
The toolkit can be used to assess the possible impacts of different options for site-scale implementation of REDD+ on ecosystem services and their beneficiaries, and to compare these impacts against what would happen under a 'without REDD+' scenario. It can thus help to inform the planning of REDD+ interventions that provide multiple benefits and are in line with social and environmental safeguards.

What can it not be used for?

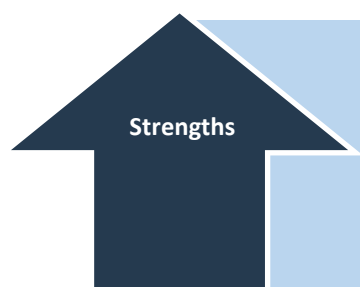
The toolkit can not be used to carry out a full economic valuation of all ecosystem services (although monetary values for some services can be calculated). The level of accuracy in measuring ecosystem services that can be achieved with the methods provided is not sufficient for use in a payment for ecosystem services (PES) scheme or for use in carbon monitoring for REDD+.

REDD+ activities that can be addressed

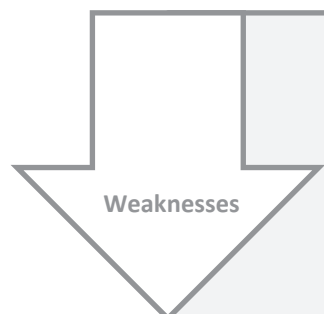
✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of the CCI Toolkit for Site-Scale Ecosystem Service Assessment?



- The toolkit is designed to fit different levels of capacity and available resources, and provides default values and recommendations for use of remotely collected information where collection of field data and household surveys aren't possible.
- By including an assessment of beneficiaries in the analysis, the toolkit can help to raise awareness of the socio-economic implications of land use choices for different stakeholders.



- The toolkit only provides methods for the assessment of a limited number of ecosystem services (climate regulation, water provision and quality, harvested wild goods, cultivated goods and nature-based tourism and recreation).
- Although the methods and approaches presented in the toolkit have been tested at four case study sites, the user manual is not yet available online. However, there are plans for this to be freely available in the near future.



Expertise?

The guidance is aimed at assessment practitioners but designed to be used by persons with limited prior experience of measuring and assessing ecosystem services



Time requirements?

Learning to use the tool: < 1 week
Application of the tool: ca. 2–10 weeks, depending on scope and required accuracy

Further resources:

Nepalese Case Study: <http://www.birdlife.org/datazone/sowb/casestudy/238>

Acknowledgements

We would like to thank Dr Claire Brown at UNEP-WCMC for review of this factsheet.

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Website: <http://www.un-redd.org/tabid/1016/Default.aspx>



The High Conservation Value Forest (HCVF) Toolkit

<http://www.hcvnetwork.org/resources>

SCALE:

**Sub-national
to National**



ACCESS:

**OPEN
COMMERCIAL
RESTRICTED**

SOFTWARE-BASED:

**YES
NO**

LANGUAGE:



What is the HCVF Toolkit?

The HCVF toolkit offers practical guidance and tools on identifying and managing High Conservation Value Forests (HCVF). HCVF are areas of forest that have exceptional or critical ecological or social attributes (e.g. forests that contain rare and/or threatened species and ecosystems, or that provide essential provisioning or cultural services to local communities) and need to be appropriately managed in order to maintain or enhance these values. The 'Global' Toolkit provides guidance on how to apply the generic definition of High Conservation Values (HCVs) and develop specific, detailed and clear interpretations for a particular country or region. National interpretations of the HCVF toolkit are available for around 20 countries worldwide.

What can it be used for in the context of REDD+?

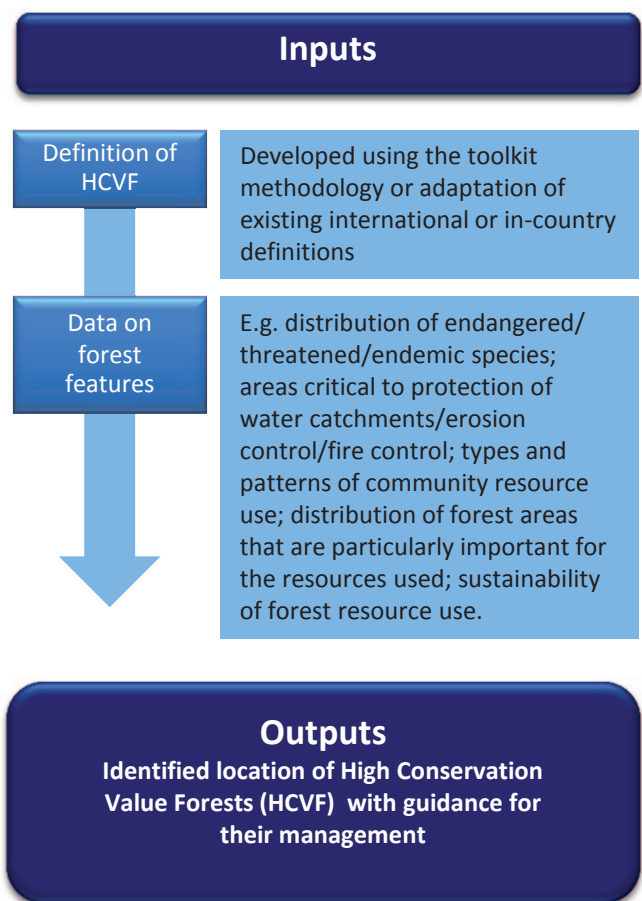
The toolkit could be used to identify priority areas for REDD+ (especially for activities to reduce deforestation and forest degradation and conserve forest carbon stocks) at a national or sub-national scale, by highlighting areas with a high potential for multiple benefits. It can also be used at the site or project level to identify critical co-benefits (i.e. biodiversity, ecosystem services and social values) and manage these appropriately.

What can it not be used for?

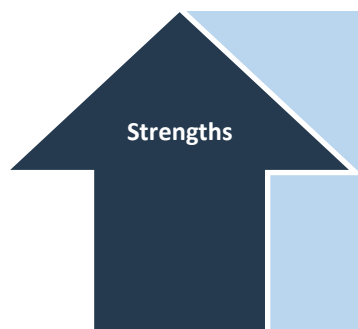
The toolkit requires no specific expertise to understand, but applying it requires a range of technical skills and it is not an off the shelf mapping tool. It does not include GIS software, so in order to present HCVs spatially it is necessary to use a GIS package and acquire the relevant data.

REDD+ activities that can be addressed

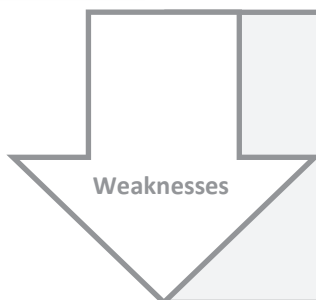
✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of the HCVF Toolkit?



- When data is available, undertaking a high conservation value assessment exercise is a relatively rapid way of identifying priority areas for conservation of biodiversity and ecosystem services and for achieving multiple benefits from REDD+.
- The HCVF concept is internationally recognised (see www.hcvnetwork.org).
- The toolkit is freely available and has national interpretations in numerous countries including a number of REDD+ countries.



- A time consuming data collection and collation effort may be needed to locate the HCVs at site level when sufficient data is not yet available.
- Whilst the tool specifically addresses the full range of forest based co-benefits for REDD, it does not provide carbon mapping or a decision-making framework, and therefore must be combined with a carbon tool.



Expertise?

Understanding the Toolkit requires no specific expertise. Applying the HCV approach at site scale may require social, biological, and land use management expertise depending on scale and impact of project.



Time requirements?

Learning to use the tool: 2–3 days
Application of the tool: Varies according to scale, application and data availability; can take up to several months for complex site-level assessments

Further resources:

HCV Resource Network Home Page: www.hcvnetwork.org

Global HCV Toolkit and its translations: <http://www.hcvnetwork.org/resources/global-hcv-toolkits>

National HCV Toolkits: <http://www.hcvnetwork.org/resources/national-hcv-interpretations>

References:

1. HCVF www.hcvnetwork.org - Accessed 11/09/12.
2. Jennings, S., Nussbaum, R., Judd, N., Evans, T. 2003. The High Conservation Value Forest Toolkit Edition 1.
3. ProForest. 2003. Part 2: Defining High Conservation Values at a national level: a practical guide
4. ProForest. 2003. Part 3: Identifying and managing High Conservation Values Forests: a guide for forest managers

Acknowledgements

We would like to thank Dr Christopher Stewart at ProForest for review of this factsheet.

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Website: <http://www.un-redd.org/tabid/1016/Default.aspx>



UNEP



WCMC

CI Rapid Assessment Programme (RAP) Toolkit

<https://learning.conservation.org/biosurvey/RAP/Toolkit/Pages/default.aspx>

SCALE:

Site-level



ACCESS:

OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:

YES
NO

LANGUAGE:

EN

What is the CI RAP Toolkit?

The RAP Toolkit developed by Conservation International's Rapid Assessment Programme is an online resource that provides information and guidance for planning, designing, implementing and publishing rapid biodiversity surveys. Such surveys can be used to produce a quick assessment of the status of biodiversity in an area and its value for conservation, and to identify species in need of conservation action. The toolkit helps to identify cost-effective methods for data collection and sampling design and provides resources for species identification and data analysis.

What can it be used for in the context of REDD+?

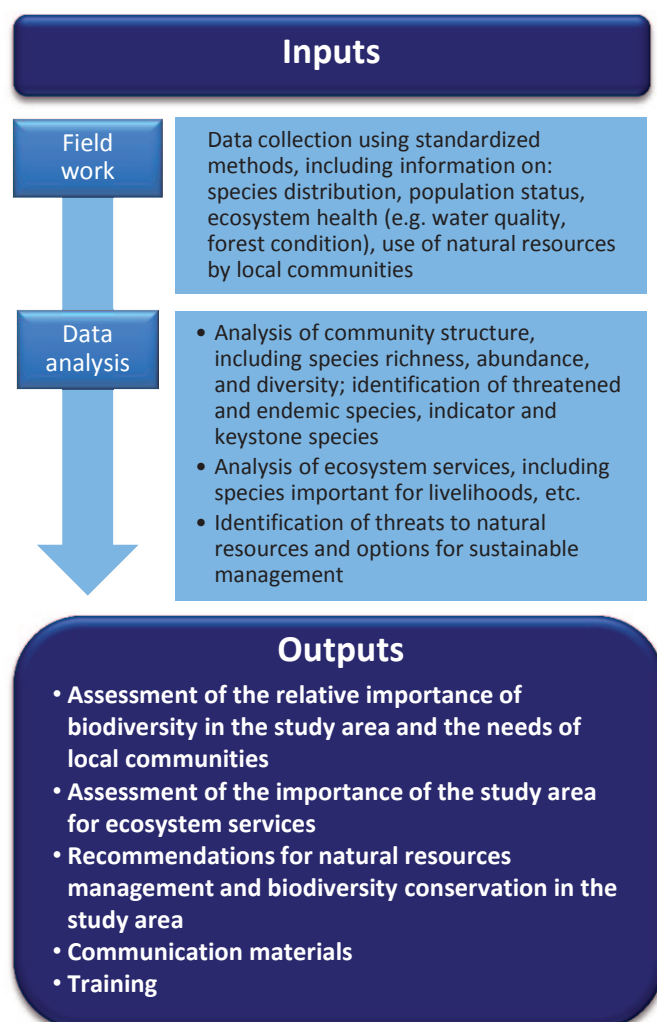
The methods described in the toolkit can be used to collect baseline information on biodiversity to facilitate the planning of REDD+ actions that provide biodiversity benefits and avoid negative impacts on biodiversity in line with REDD+ safeguards. They can also be used to monitor the impacts of REDD+ on biodiversity as a basis for adaptive management and for providing information on how safeguards are addressed and respected.

What can it not be used for?

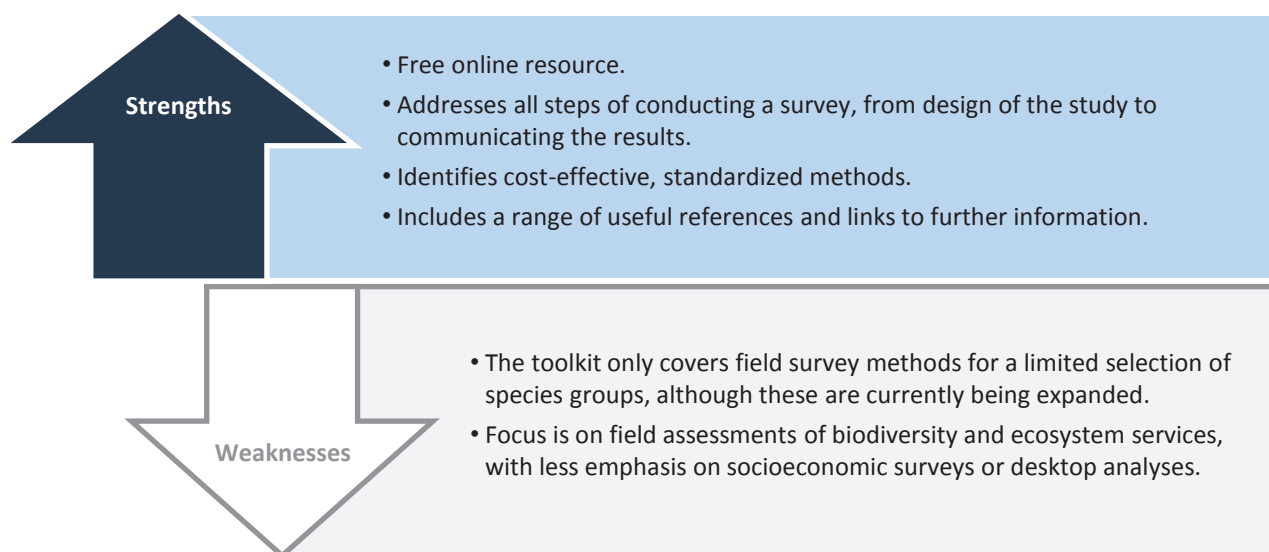
The RAP Toolkit does not provide methods for the economic valuation of costs and benefits of biodiversity conservation, or tools that can assist with decision-making where trade-offs between biodiversity and other benefits need to be considered in REDD+ planning.

REDD+ activities that can be addressed

✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of the RAP Toolkit?



Expertise?

Some species identification skills and knowledge of ecological and socio-economic monitoring methods required



Time requirements?

Learning to use the tool: < 1 week
Application of the tool: ca. 3-6 weeks

Further resources:

RAP Toolkit Home Page: <https://learning.conservation.org/biosurvey/RAP/Toolkit/Pages/default.aspx>

RAP+ Factsheet: http://www.conservation.org/Documents/CI_RAP_Rapid-Assessment-Program_Discovering-and-Describing-Nature_Factsheet_2012.pdf

RAP Publication Series: <https://learning.conservation.org/biosurvey/RAP/Pages/Results.aspx>

RAP Survey Database: <https://rap.conservation.org/rap/>

Acknowledgements

We would like to thank Dr Trond Larsen at Conservation International for review of this factsheet

Contact

Climate Change and Biodiversity Programme

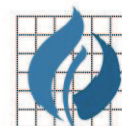
UNEP World Conservation Monitoring Centre

Email: climate@unep-wcmc.org

Website: <http://www.un-redd.org/tabid/1016/Default.aspx>



UNEP



WCMC



Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST)

<http://www.naturalcapitalproject.org/InVEST.html>

SCALE:

Sub-national
to International



ACCESS:

OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:

YES
NO

LANGUAGE:

EN

What is InVEST?

InVEST is a set of spatially explicit models that can be used to quantify, map and value the benefits provided by terrestrial, freshwater and marine ecosystems in either biophysical terms (e.g. tons of carbon sequestered) or economic terms (e.g. Net Present Value of sequestered carbon). It can be used to map the relative importance of different areas for ecosystem services including (i) carbon storage and sequestration, (ii) provision of habitat for biodiversity, (iii) water purification, (iv) sediment retention, (v) timber production and (vi) crop yield.

What can it be used for in the context of REDD+?

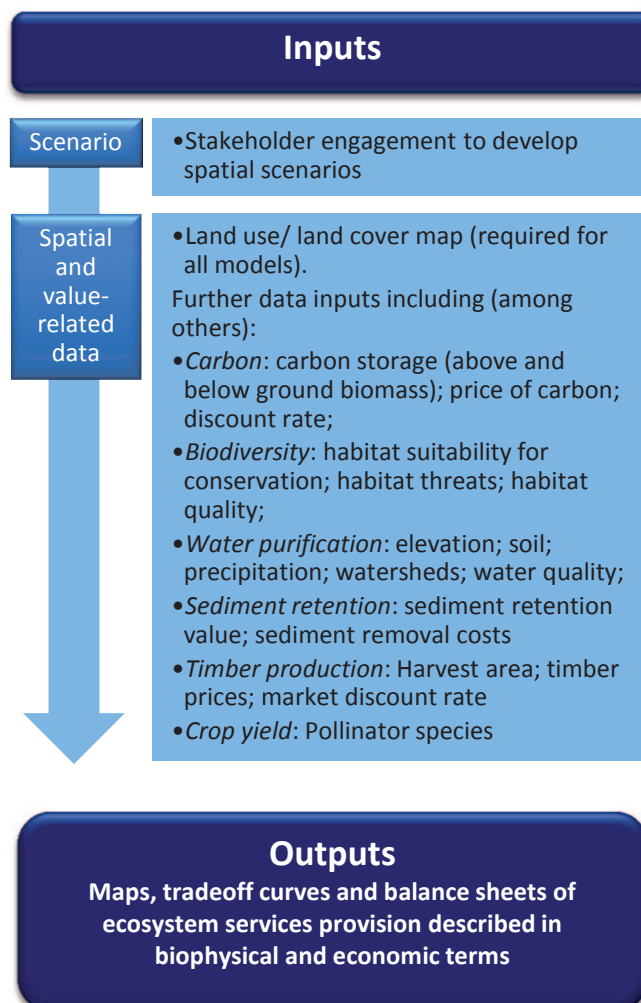
InVEST can apply scenarios and models to predict land use and land cover change, as well as impacts of land management plans on ecosystem services. In the context of REDD+ planning, this tool could be useful for assessing impacts on ecosystem services and their economic values under different baseline and REDD+ scenarios. InVEST allows to assess the tradeoffs between different ecosystem services under different REDD+ activities. Consequently, it is a useful tool to evaluate where and how to implement REDD+ so as to optimize multiple benefits and to address safeguards.

What can it not be used for?

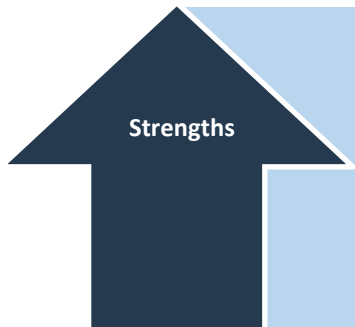
InVEST does not allow for the development of land use scenarios themselves. Its valuation function is limited so far and cannot be applied for biodiversity. It does not allow to evaluate REDD+ costs.

REDD+ activities that can be addressed

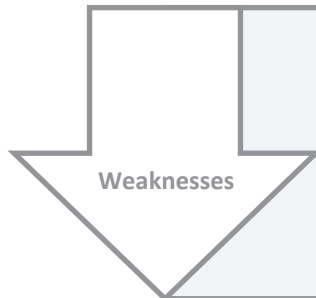
✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of InVEST?



- Open source software.
- Based on sophisticated ecological modelling modules.
- Based on a production function that can give good estimates for ecosystem service quantities and values if appropriately calibrated.
- Can address carbon emission reductions and can integrate a number of relevant other ecosystem service types.
- Case studies, user manuals and guidance on how to compile and format data are available online.



- Production function approach oversimplifies the biophysical cycles and relationships.
- InVEST requires large amounts of data and results are very sensitive to data quality.
- Economic values are calculated based on avoided damages, so that not all aspects of ecosystem service values can be considered.
- Models to quantify the value of ecosystem services more accurately are still under development.



Expertise?

Some InVEST models require ArcGIS 9.3 or 10 and the ArcGIS Spatial Analyst extension, which requires basic to intermediate skills in ArcGIS. However, many InVEST models run independently of ArcGIS. The ArcGIS dependency will be removed with the release of InVEST 3.0 in early 2013.



Time requirements?

Learning to use the tool: 2-3 weeks

Application of the tool: 2-3 weeks

Collection and preparation of input data:
Up to several months, depending on data availability

Further resources:

InVEST Home Page: <http://www.naturalcapitalproject.org/InVEST.html>

InVEST Online User guide: http://ncp-dev.stanford.edu/~dataportal/invest-releases/-ArcGIS-documentation/current_release/

Natural Capital Project Publications: <http://www.naturalcapitalproject.org/publications.html>

Acknowledgements

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Website: <http://www.un-redd.org/tabid/1016/Default.aspx>



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WCMC

Artificial Intelligence for Ecosystem Services (ARIES)

<http://ariesonline.org/>

SCALE:
Sub-national
to
International



ACCESS:
OPEN (for non-profit
applications)
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:
YES
NO

LANGUAGE:



What is ARIES?

ARIES is a software application that supports ecosystem service assessment and valuation. It builds models of supply and demand for ecosystem services from stored component models, and simulates the dynamic flow of benefits spatially. It is able to accommodate component models that work at different scales and use different forms of input data, measurement units and modelling paradigms.

What can it be used for in the context of REDD+?

ARIES allows for consideration of ecosystem services in the decision making process. It could potentially be a useful tool for spatial planning to achieve multiple benefits from REDD+, and for targeting of payments for ecosystem services.

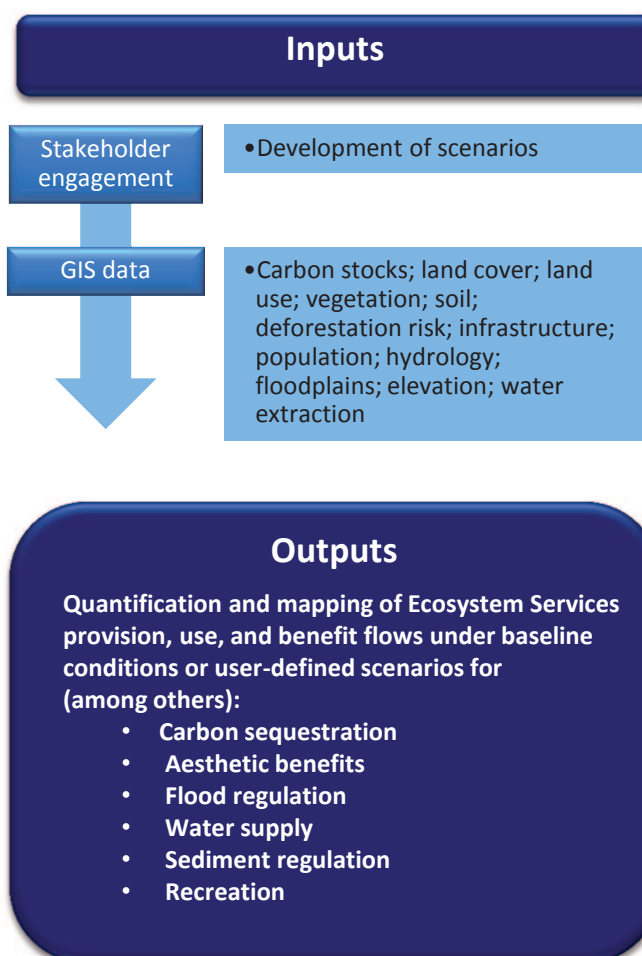
Specifically, the tool allows to map areas that are important for ecosystem services and biodiversity, to quantify service flows and to value the resulting benefits in terms of different monetary and non-monetary criteria. This can be done for a number of land use scenarios so as to reflect different REDD+ options. This can assist in evaluating trade-offs and in prioritising where and how to implement REDD+ so as to optimize multiple benefits and address safeguards.

What can it not be used for?

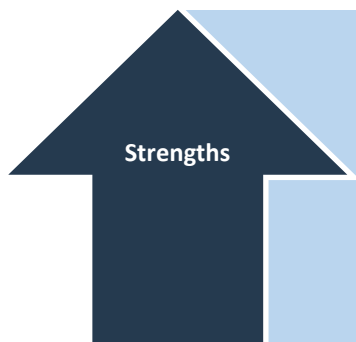
Development of scenarios requires training. While carbon sequestration can be modelled, there is no module to assess reduced carbon emissions. ARIES does not allow evaluation of REDD+ costs.

REDD+ activities that can be addressed

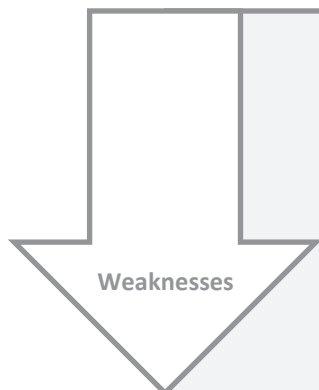
✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of ARIES?



- Can be used as a web-based service (once defined and composed, ARIES models can be run remotely through any web browser).
- ARIES includes probabilistic Bayesian models that quantify the uncertainty of their outputs based on the uncertainty of input data and can operate in data-scarce conditions where deterministic models cannot run. ARIES models actual flows of benefits dynamically.
- ARIES automatically chooses different models depending on data availability and social and ecological context.



- So far ARIES is only calibrated for 7 geographic case studies on 8 ecosystem services; no biodiversity module available yet. Generalized models are under development.
- The development of ecosystem service models for new case studies requires modelling expertise. The web interface is still at a demonstrational stage.
- So far there is no REDD+ specific application to address reduced carbon emissions.
- The economic valuation module is still under development.



Expertise?

Some knowledge of ecosystem services modelling would be useful. There is no need to purchase and gain proficiency using commercial GIS or modelling software, as all functions are handled remotely and returned to the user via any web interface.



Time requirements?

Learning to use the tool: 2-3 weeks

Application of the tool: 1-2 weeks

Development of new modules and case studies: Depends on data availability and desired quality of results. Cannot be done using the web interface. Training is available at the International Spring University on Ecosystem Services Modelling (see resources).

Further resources:

ARIES Home Page: <http://ariesonline.org/>

ARIES User Guide: <http://www.ariesonline.org/docs/ARIESModelingGuide1.0.pdf>

ARIES Case Studies: http://ariesonline.org/case_studies.html

ARIES Modeling Instruction: <http://www.bc3research.org/springuniversity>

Papers on ARIES modelling approaches: <http://ariesonline.org/resources.html>

Acknowledgements

We would like to thank Prof. Ferdinando Villa at BC3 (Basque Centre for Climate Change) for review of this factsheet.

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UNEP



WCMC

Scenarios for Sustainability Software Toolkit

<http://scenariosforsustainability.org/>

SCALE:

Site-level to
International



ACCESS:

OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:

YES
NO

LANGUAGE:

EN

What is the Scenarios for Sustainability Software Toolkit?

The toolkit aims to support users in the creation of coherent scenarios of possible future developments as a basis for communication between stakeholders and the planning of sustainable policy interventions. It is a collection of free software “tools” that can cover all aspects of a scenario exercise, from the development of a scenario narrative to qualitative modelling, quantitative modelling and the selection of indicators.

The website provides an introduction to the tools and links for download, as well as background information and general guidance on the development and use of scenarios.

What can it be used for in the context of REDD+?

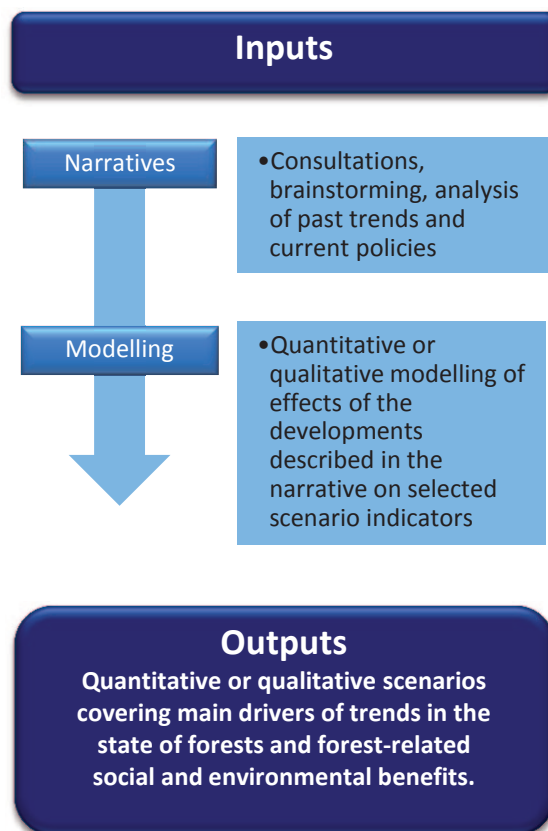
Because of the long time horizons that are typical for REDD+ planning, scenario exercises can be an important part of the process to ensure that possible future developments with regard to key factors are taken into account. The development of ‘best case scenarios’ can also be useful in order to identify realistic targets for the implementation of REDD+ and plan appropriate interventions to achieve them.

What can it not be used for?

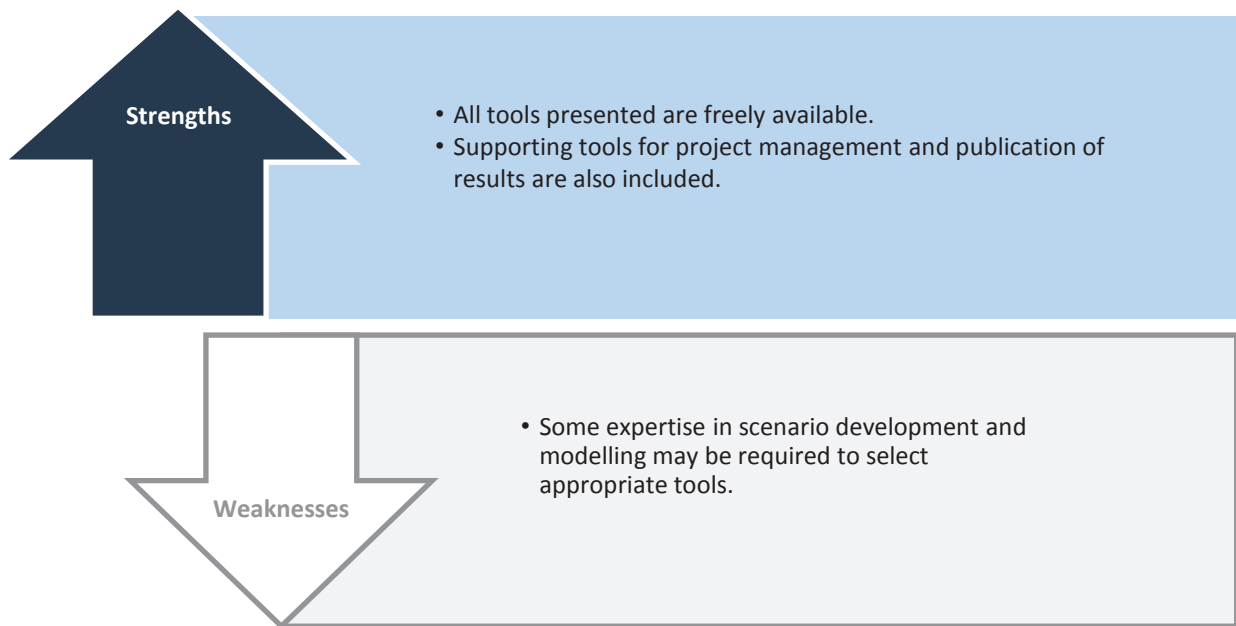
The toolkit does not provide easily accessible guidance on the selection of an appropriate subset of scenario tools to meet the needs of a particular planning situation. It also does not cover every possible kind of scenario exercise. Depending on the needs of the study, additional software and guidance may be needed.

REDD+ activities that can be addressed

✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of the Scenarios for Sustainability Software Toolkit?



Expertise?

The toolkit caters to a variety of users with different levels of expertise



Time requirements?

Learning to use the tool: Depending on level of expertise, up to several weeks to select appropriate tools and become familiar with their use.

Application of the tool: Depends on selected tools; a full scenario exercise including participatory development of the narrative and modelling of indicators may take between a few weeks and several months.

Acknowledgements

We would like to thank Dr Eric Kemp-Benedict at SEI-US for review of this factsheet.

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CIFOR/ASB/ICRAF Field Guide to the Future

<http://www.asb.cgiar.org/PDFwebdocs/Evans-et-al-2006-Field-guide-to-the-future.pdf>

SCALE:
Site-level



ACCESS:
OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:
YES
NO

LANGUAGE:
EN

What is the Field Guide to the Future?

The Field Guide to the Future is a step-by-step manual for using scenario-based methods for planning processes in communities that are dependent on natural resources. The guide is organized as a teaching tool to facilitate the use of the methods without additional training. The methods covered are use of scenarios (defined as creative stories about plausible futures), projections (defined as analytical forecasts of the future based on current trends), visioning (defined as development of the narrative of an ideal future) and identification of pathways (defined as specific strategies and action steps that lead to an identified future state).

What can it be used for in the context of REDD+?

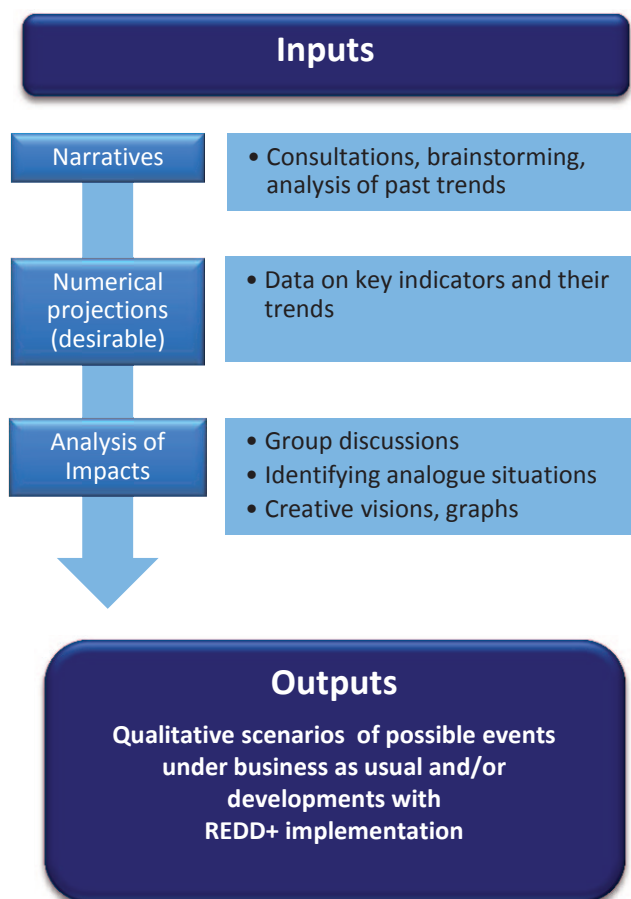
The tool can assist with the development of plans for REDD+ implementation at the local level. While community involvement in planning is crucial for the success of REDD+ actions on the ground, it often suffers from a lack of awareness and information about possible future developments. Scenario exercises can therefore be an important part of a consultation or participatory process to ensure that possible future developments with regard to key factors are taken into account.

What can it not be used for?

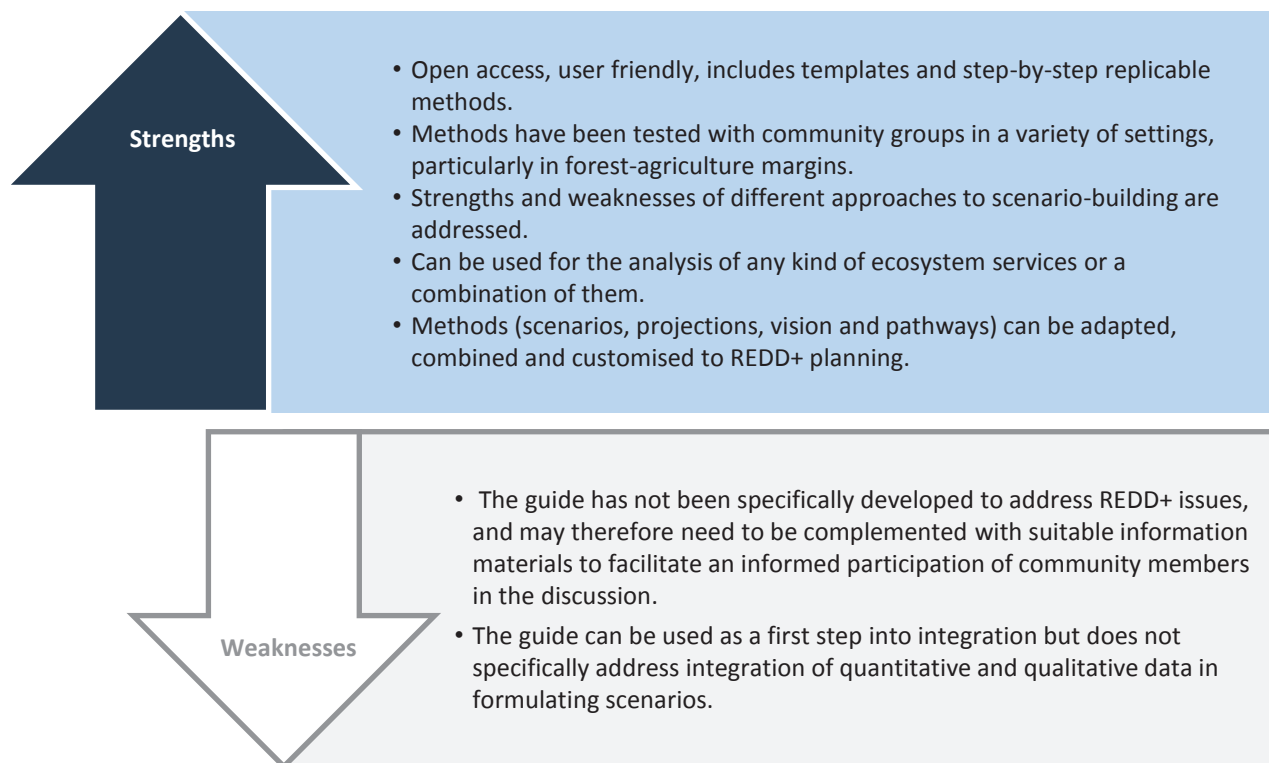
The tool does not cover scenario techniques that require the use of advanced technology such as modelling software or interactive mapping tools. Whilst it is not a numerical tool in itself, it can use and/or inform quantitative scenarios providing a more integrated view of REDD+ outcomes and impacts.

REDD+ activities that can be addressed

✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of the Field Guide to the Future?



Expertise?

Some experience with participatory processes would be helpful



Time requirements?

Learning to use the tool: < 1 week
Application of the tool: < 2 months (including time for preparation of workshops)

Acknowledgements

We would like to thank Sandra J. Velarde at the Australian National University for review of this factsheet.

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FALLOW: Forest, Agroforest, Low-value Landscape Or Wasteland?

<http://www.worldagroforestrycentre.org/sea/fallow>

SCALE:
Sub-National



ACCESS:
OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:
YES
NO

LANGUAGE:
EN

What is FALLOW?

The FALLOW model is a spatially explicit landscape dynamics model that can be used to analyse drivers and consequences of land use change at small to medium scale. It can simulate the dynamics of forest conversion to shifting cultivation, crop-fallow rotation systems, agroforestry, and monoculture plantations, based on consideration of biophysical and socio-economic factors like soil fertility, labour availability, food production and demand, site accessibility, and other income options including utilisation of forest products and livestock production. The simulation of farmer decisions on agricultural land expansion and labour allocation includes an element of learning from experience. Impact modules allow an assessment of the consequences of land use change in terms of human carrying capacity (food sufficiency), watershed functions, plant species richness and carbon stocks.

What can it be used for in the context of REDD+?

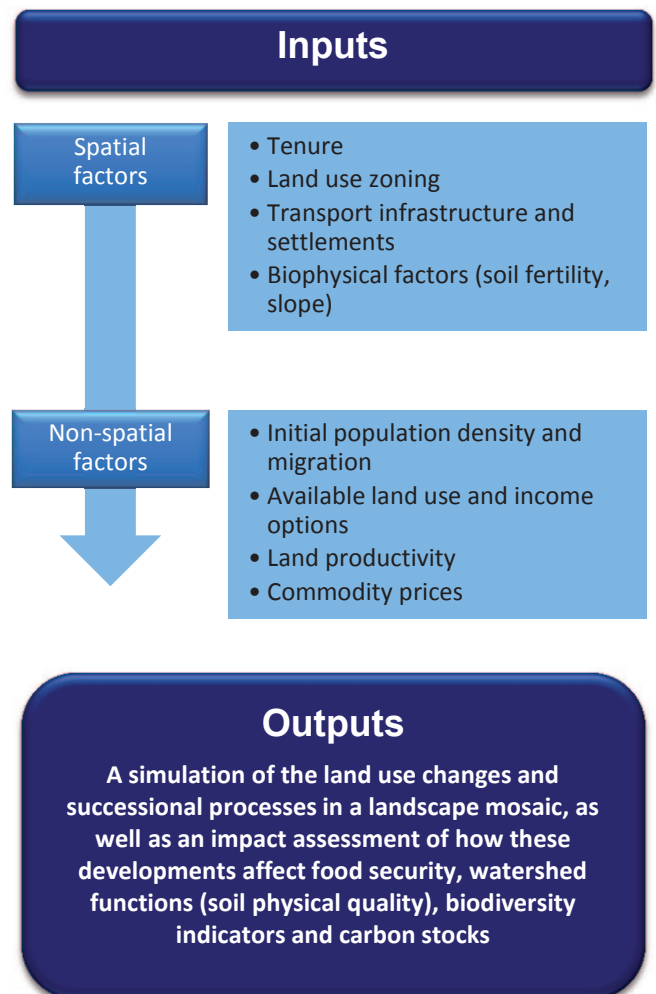
FALLOW can be used for impact assessment and scenario studies, assisting the identification of appropriate REDD+ interventions by visualizing the possible/likely consequences for land demand, local livelihoods and selected environmental services of factors such as changes in prices, population density and human migration, availability of new technology, spatial zoning of land use, pest and disease pressure or climate change.

What can it not be used for?

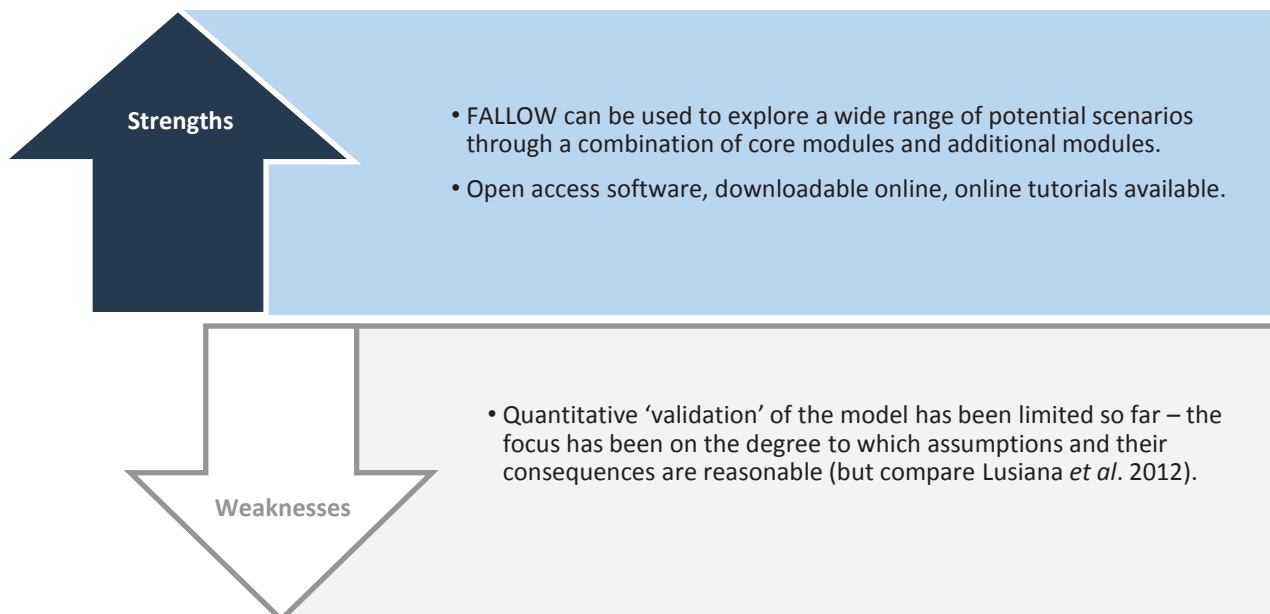
Although FALLOW can be applied with real-life spatial data sets, the model is not intended to provide spatially explicit projections of the future in a particular setting, but to capture overall trends that follow from a reasonable set of assumptions. FALLOW is particularly suited to simulate rural or peri-urban landscapes where land-based activities (i.e. agriculture, forest product extraction) are still the main livelihood option; it cannot be used to simulate urban settings.

REDD+ activities that can be addressed

✓	Reducing emissions from deforestation
	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of FALLOW?



Expertise?

Knowledge on locally relevant socio-economic processes and land use transitions required



Time requirements?

Learning to use the tool: < 1 week

Application of the tool: < 1 month, depending on availability of input data

Any additional software requirements?

To run the model, PC-RASTER, MS-Excel 2000 and a processor of the same generation as INTEL PENTIUM IV are required as a minimum.

Further resources:

FALLOW Manual: <http://www.worldagroforestrycentre.org/af2/sites/default/files/models/FALLOW%20Manual%20and%20Software.pdf>

References:

1. Lusiana, B., van Noordwijk, M., Cadisch, G. 2012. Land sparing or sharing? Exploring livestock fodder options in combination with land use zoning and consequences for livelihoods and net carbon stocks using the FALLOW model. *Agriculture, Ecosystems and Environment*, 159, 145–160.
2. van Noordwijk, M., Suyanto, D.A., Lusiana, B. FALLOW: Background on a dynamic landscape model: <http://www.worldagroforestry.org/sea/products/afmodels/fallow/FALLOW0303/FALLOW%20Manual.pdf>

Acknowledgements

We would like to thank Dr Betha Lusiana at the World Agroforestry Centre (ICRAF) for review of this factsheet.

Contact

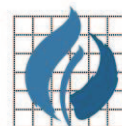
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Website: <http://www.un-redd.org/tabid/1016/Default.aspx>



UNEP



WCMC

Dyna-CLUE: ‘Dynamic Conversion of Land Use and its Effects’ Model

<http://www.ivm.vu.nl/clue>

SCALE:
Sub-national to
International



ACCESS:
OPEN/RESTRICTED
COMMERCIAL

SOFTWARE-BASED:
YES
NO

LANGUAGE:

EN

What is Dyna-CLUE?

Dyna-CLUE is part of the CLUE model family, a group of land use and land cover change models. Dyna-CLUE has been specifically developed for the analysis of land use change in small regions (e.g. a watershed or province), at a fine spatial resolution. It allows the analysis and prediction of land use change in relation to socio-economic and biophysical driving factors. In a first step, the demand for land use is estimated outside the model based on an analysis of trends in land use or more advanced (economic) models. The model then creates a spatially explicit scenario of likely changes in land use through an allocation procedure.

What can it be used for in the context of REDD+?

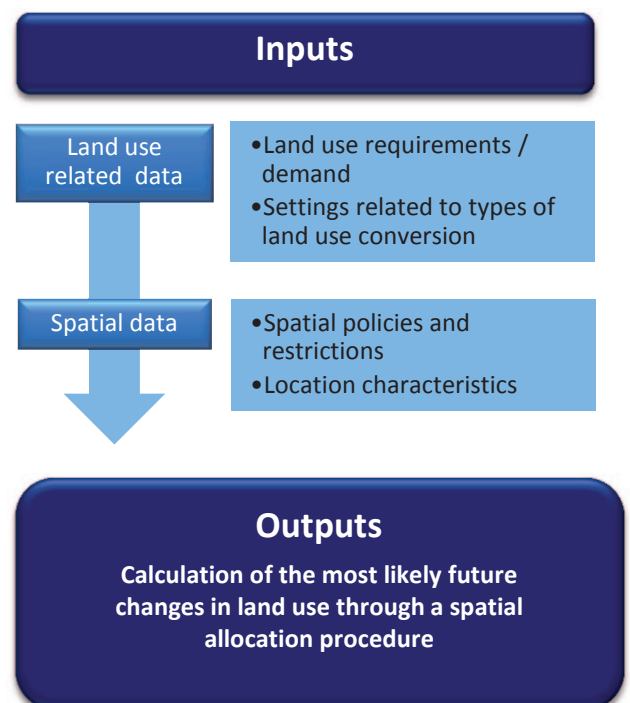
Typical applications of the Dyna-CLUE model include the simulation of deforestation, land degradation, urbanization and land abandonment, and the integrated assessment of land cover change. The model is especially useful for assessments of changes in complex spatial patterns of land use, as it is possible to simulate multiple land use types simultaneously. In a REDD+ context, Dyna-CLUE can be used to simulate land use developments both without and with REDD+ interventions.

What can it not be used for?

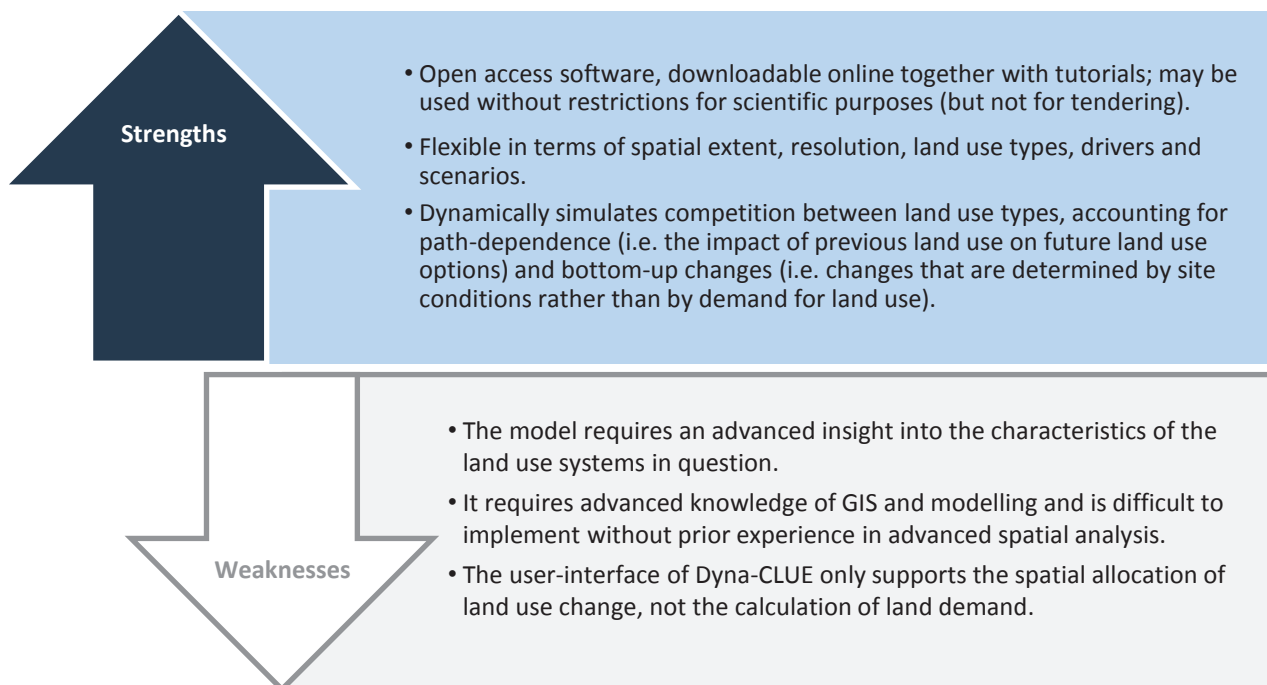
The main focus of Dyna-CLUE is to analyze the impacts of different scenarios of land demand and land use policies on the spatial patterns of land use. It is not specifically designed to analyze the impacts of different policies on the size of land demand.

REDD+ activities that can be addressed

✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of Dyna-CLUE?



Expertise?

Advanced knowledge of GIS and modelling is required



Time requirements?

Learning to use the tool: 1 – 2 weeks

Application of the tool: < 1 week

Collection and preparation of input data: Up to several months, depending on data availability and desired quality of results

Further resources:

CLUE Home Page: <http://www.ivm.vu.nl/clue>

CLUE Manual: http://www.ivm.vu.nl/en/Images/Exercises_tcm53-284019.pdf

References:

1. Verburg PH, Overmars KP. 2009. Combining top-down and bottom-up dynamics in land use modeling: exploring the future of abandoned farmlands in Europe with the Dyna-CLUE model. *Landscape Ecology* 24(9): 1167-1181. <http://dx.doi.org/10.1007/s10980-009-9355-7>
2. Verburg PH, Soepboer W, Limpiada R, Espaldon MVO, Sharifa MA, Veldkamp A. 2002. Modelling the spatial dynamics of regional land use: The CLUE-S model. *Environmental Management* 30: 391-405.

Acknowledgements

We would like to thank Prof. Peter Verburg at the VU University Amsterdam, Institute for Environmental Studies, for review of this factsheet.

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GLOBIOM – Global Biosphere Management Model

www.globiom.org

SCALE:

National to
Global



ACCESS:

OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:

YES
NO

LANGUAGE:

EN

What is GLOBIOM?

GLOBIOM is a global economic simulation model that has been developed to assess competition for land use between the main land-based production sectors: agriculture, bioenergy, and forestry. It is based on a recursively dynamic partial equilibrium model. The supply side is spatially explicit and takes into account land and weather characteristics. The market equilibrium is found by maximizing the sum of producer and consumer surplus subject to resource, technological, and political constraints. GLOBIOM provides decision support for integrated land use planning across the three sectors in order to avoid serious land use conflicts and improve overall provision of food, forest fibre, and bio-fuels.

What can it be used for in the context of REDD+?

GLOBIOM identifies trends and drivers in future deforestation in various scenarios. It is a useful tool to establish reference emission levels, and to identify possible trends in land demand from other sectors that REDD+ planning needs to take into account. It can further be used to analyse the land use impacts that REDD+ payments could have if carbon prices are set at a certain level.

GLOBIOM can simulate the shifting of land use from one place to another as a consequence of changes in economic drivers (displacement). It can thus help to understand where carbon payments at a certain price would not be sufficient to address the safeguard on avoiding incentives for conversion of natural forest. If combined with spatial data on ecosystem services and biodiversity, GLOBIOM can also show where REDD+ can avoid negative environmental impacts from land use change and achieve multiple benefits.

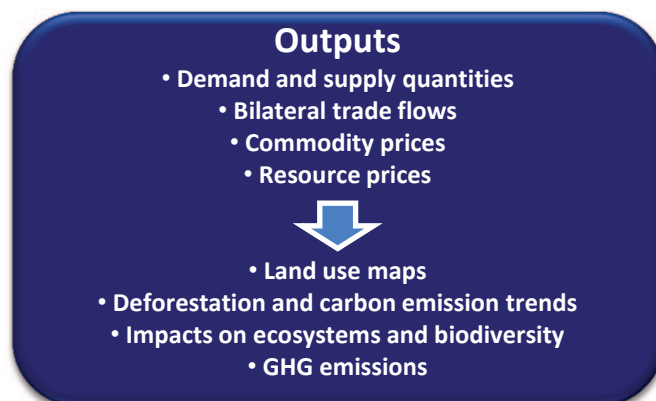
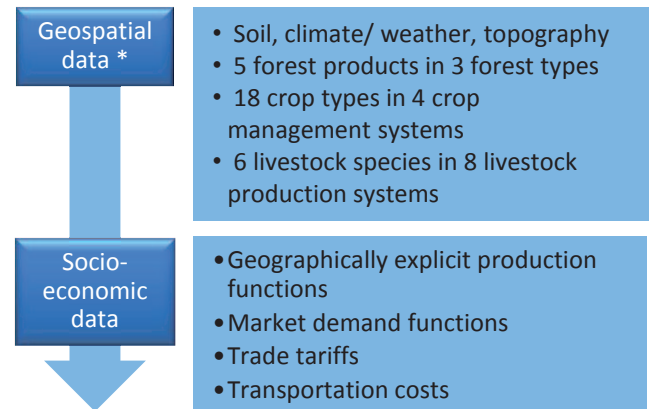
What can it not be used for?

While this tool examines what would happen if REDD+ leads to a certain carbon price, it does not provide explicit decision support on how REDD+ needs to be implemented to reach certain goals for emission reductions and other ecosystem benefits. Since GLOBIOM is a partial equilibrium model, the great detail in the representation of the agricultural and forest sectors is traded off for the missing link to other sectors in the economy.

REDD+ activities that can be addressed

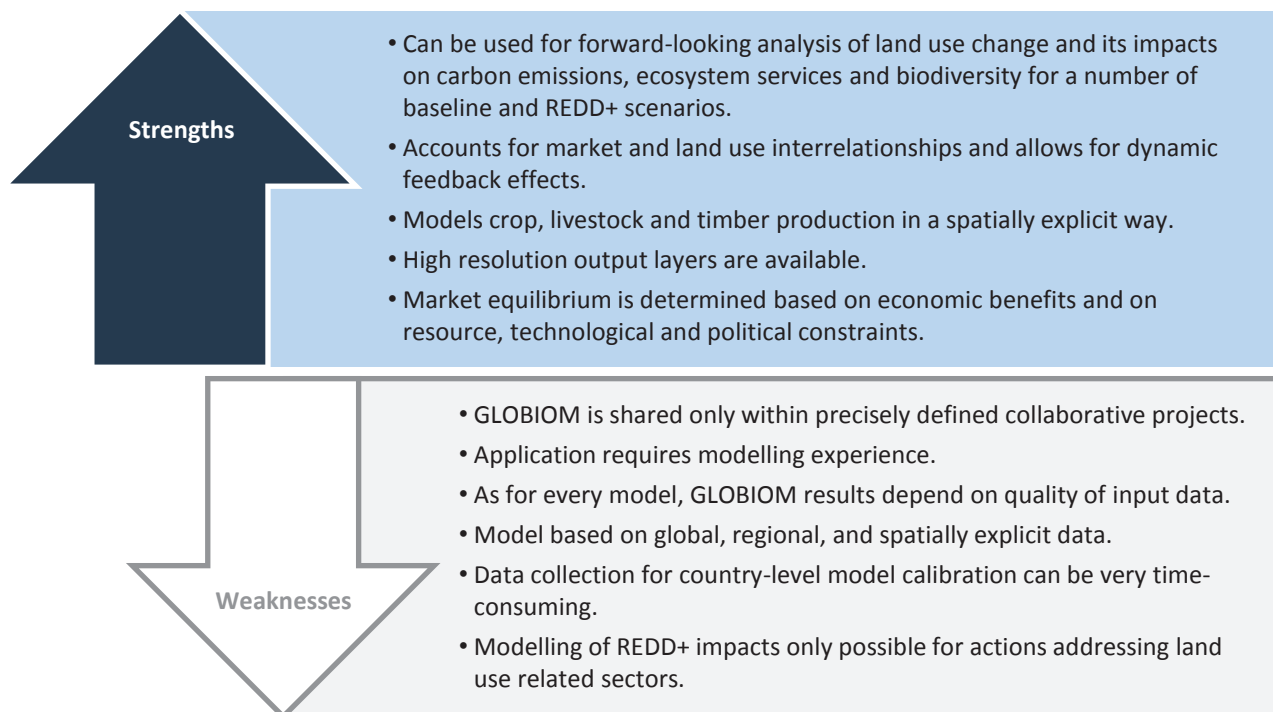
✓	Reducing emissions from deforestation
	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
	Sustainable management of forests
✓	Enhancement of forest carbon stocks

Inputs



*data from various research institutes (NASA, JRC, FAO, USDA, IFPRI, etc).

What are the strengths and weaknesses of GLOBIOM?



Expertise?

Sophisticated technical expertise and knowledge of land use modelling and economic simulation is required



Time requirements?

Learning to use the tool: 3-6 months

Application of the tool: 2-4 months

Collection and preparation of input data:

Up to several months, depending on data availability and desired quality of results

Further resources:

GLOBIOM Home Page: <http://www.globiom.org>

Acknowledgements

We would like to thank Dr Petr Havlik at IIASA for review of this factsheet.

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Spatially Explicit Scenario Analysis for Indonesia's Forest Moratorium

<http://reddcalculator.com>

SCALE:

Sub-national



ACCESS:

OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:

YES
NO

LANGUAGE:

EN

What is the Forest Moratorium Tool?

The Forest Moratorium tool is a web-based application for evaluating the environmental and socioeconomic outcomes of implementing Indonesia's forest moratorium in Kalimantan under alternative scenarios. The user can specify carbon values and socio-economic parameters for each land use and can select moratorium conditions to define the scenario. The tool then calculates outcomes for each Moratorium scenario at district level, provincial level and for the whole of Kalimantan, in terms of the forest area conserved, the carbon stocks maintained, and the financial costs (defined as foregone financial benefits from conversion to oil palm). The application also displays the spatial distribution of deforestation in Kalimantan through a 'Googlemap' interface.

What can it be used for in the context of REDD+?

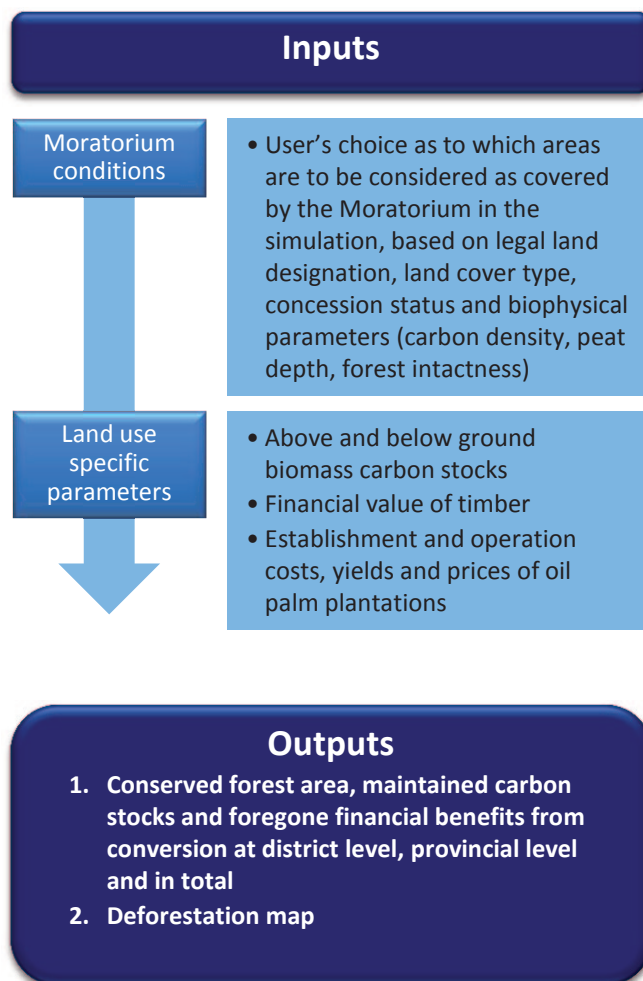
The tool has been developed in the context of the bilateral agreement on REDD+ between Norway and Indonesia that requires Indonesia to implement a two-year moratorium on new concessions for the conversion of peatland and natural forests. The tool thus reflects a specific aspect of REDD+ implementation in Indonesia. The tool allows to calculate moratorium outcomes and to update results as more recent information becomes available for carbon stocks and financial benefits from alternative land uses. The tool can assist in understanding the trade-offs between environmental benefits of REDD+ and its financial costs, so that it can play an important awareness raising role, even beyond its original context.

What can it not be used for?

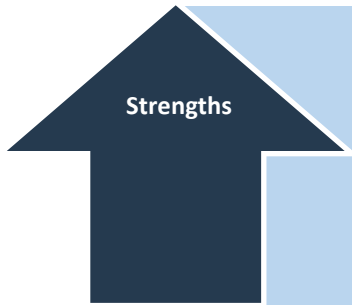
The tool cannot be applied in other geographical contexts, and it does not allow to account for outcomes of REDD+ activities that go beyond reducing conversion of forest and peat lands to oil palm plantations. It cannot support REDD+ planning to prioritise where and how to implement REDD+.

REDD+ activities that can be addressed

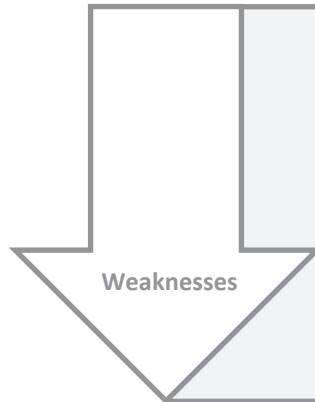
✓	Reducing emissions from deforestation
	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
	Sustainable management of forests
	Enhancement of forest carbon stocks



What are the strengths and weaknesses of the Forest Moratorium Tool?



- Due to user-friendliness it can play an important awareness-raising role.
- Calculations and results can be easily understood.
- Potential moratorium outcomes can be quickly calculated and updated when better information becomes available.
- Everyone can use it as it does not require specific user skills or software.



- Specific to Kalimantan with focus on reducing emissions from deforestation; does not allow application in other REDD+ contexts.
- Based on a rather small number of variables, so not many different Moratorium scenarios can be considered.
- Very simplified socio-economic assumptions (e.g. assuming all non-protected forests would be converted to oil palm without a Moratorium, regardless of actual conversion permissions).
- Results depends on the accuracy of defined land use parameters.
- Out of the range of potential benefits from forest and land management, only financial value of timber and palm oil are considered.



Expertise?

No specialist knowledge required



Time requirements?

Learning to use the tool: < 2 hours
Application of the tool: < 1 day

Any additional software requirements?

The spreadsheet-based application minimally requires Microsoft Office 2007 (for Windows users), or Microsoft Office 2011 (for Macintosh users).

Further resources:

Home Page: <http://reddcalculator.com>

Manual: http://reddcalculator.com/media/files/Moratorium_report.pdf

Additionally, a downloadable spreadsheet version of this application has been developed, which allows users to work locally on their computer. This version is freely available for download at:

http://reddcalculator.com/media/files/Koh_et_al_moratorium_tool.xlsm

References:

1. LP Koh, HK Gibbs, PV Potapov & MC Hansen. 2012. REDDcalculator.com: a web-based decision-support tool for implementing Indonesia's forest moratorium. *Methods Ecol Evol* 3: 310-316.
2. Koh, L.P., Gibbs, H.K., Potapov, P.V., Hansen, M.C. Spatially Explicit Scenario Analysis of implementing Indonesia's Forest Moratorium: Environmental and Socioeconomic Tradeoffs for the Kalimantan region http://reddcalculator.com/media/files/Moratorium_report.pdf

Acknowledgements

We would like to thank Dr Lian Pin Koh at ETH Zurich for review of this factsheet.

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Species Extinction Calculator (SEC)

<http://www.speciesextinctioncalculator.com/>

SCALE:

Sub-national
to National



ACCESS:

OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:

YES
NO

LANGUAGE:

EN

What is the Species Extinction Calculator?

The Species Extinction Calculator estimates species extinction risk due to land cover changes in a landscape. It is based on a matrix-calibrated species-area model. The model's approach is different from traditional species-area calculations because it considers not only the total area of remaining suitable habitat patches, but also the influence of patch size (to take account of edge effects that reduce the habitat quality in smaller patches) and the quality of the landscape matrix between the patches (to take account of the fact that land cover types that are not suitable as permanent habitat for a species can still contribute to its survival to some degree). The model thus determines the likelihood of extinctions for a group of species (e.g. forest birds) based on changes in the total area of suitable habitat, as well as in patch size and land cover in the surrounding landscape matrix, and on the average sensitivity of species within this group to each of these types of change.

What can it be used for in the context of REDD+?

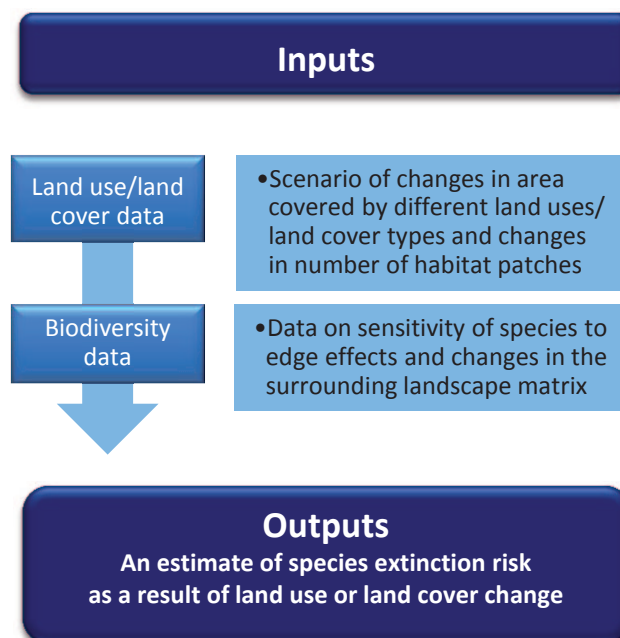
The tool allows the user to assess the effects of different land use change scenarios (e.g. reduction in area of primary forest, changes in surrounding matrix of secondary forest, agroforestry, monoculture plantation) on species diversity. It can thus be used for a quantitative assessment of biodiversity benefits (and trade-offs) of different options for REDD+ implementation.

What can it not be used for?

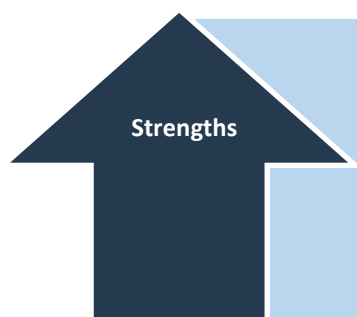
The model is not spatially explicit and does not consider variation in the distribution of species (e.g. hotspots of diversity and endemism). The tool therefore cannot provide decision support on where to prioritize or avoid certain types of REDD+ actions so as to enhance biodiversity benefits and avoid negative impacts. The model does not consider extinction risks as a result of other factors besides those linked to land-use change (e.g. overhunting).

REDD+ activities that can be addressed

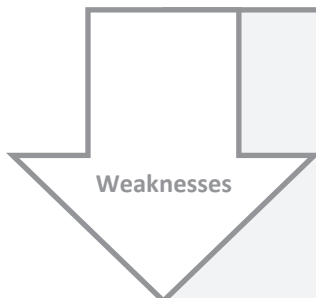
✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of the Species Extinction Calculator?



- Due to the fact that it can easily be used for any hypothetical scenario, the tool can play an important awareness-raising role.
- Including edge effects and quality of the landscape matrix increases suitability of the model for predictions of extinction risk in mixed cultural landscapes.
- Free online application.
- No modelling skills required.



- The method does not account for spatial differences in species distribution within land use / land cover types, e.g. biodiversity hotspots or centres of endemism.
- Data requirements for calibrating the model are high, and it is likely that sufficient data to run the model will only be available for well-studied species groups like mammals or birds.
- The interface is difficult to use.



Expertise?

Some knowledge of species distribution modelling required to prepare biological input parameters; no special expertise required to run the model.



Time requirements?

Learning to use the tool: < 1 day
Application of the tool: < 1 hour
Preparation of input parameters: Up to several weeks, depending on data availability

Further resources:

Species Extinction Calculator Home Page: <http://www.speciesextinctioncalculator.com/>

Further information: <http://www.lianpinkoh.com/>

References:

1. Species Extinction Calculator <http://www.speciesextinctioncalculator.com/> - Accessed 10/09/12.
2. Koh, L.P., Ghazoul, J. 2010. A Matrix-Calibrated Species-Area Model for Predicting Biodiversity Losses Due to Land-Use Change, Conservation Biology Vol. 24: 994–1001.
3. Koh, L.P., Lee, T.M., Sodhi, N.S. Ghazoul, J. 2010. An overhaul of the species–area approach for predicting biodiversity loss: incorporating matrix and edge effects. Journal of Applied Ecology, Vol. 47: 1063–1070.

Acknowledgements

We would like to thank Dr Lian Pin Koh at ETH Zurich for review of this factsheet.

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Website: <http://www.un-redd.org/tabid/1016/Default.aspx>





Land Use Calculator

<http://landusecalculator.com/>

SCALE:

**Sub-national
to National**



ACCESS:

**OPEN
COMMERCIAL
RESTRICTED**

SOFTWARE-BASED:

**YES
NO**

LANGUAGE:

EN

What is the Land Use Calculator?

The Land Use Calculator calculates environmental, financial and socio-economic outcomes of a land use scenario that is defined by the user. Up to ten different land use systems can be included by specifying a number of environmental and socio-economic parameters. Landscape configuration can be described in terms of the number of hectares covered by each land use system. A calculation of REDD+ payments can be included in the model run by defining additional parameters such as carbon price and deforestation baseline. This tool can help decision-makers to evaluate the consequences and trade-offs of alternative land use and development options.

What can it be used for in the context of REDD+?

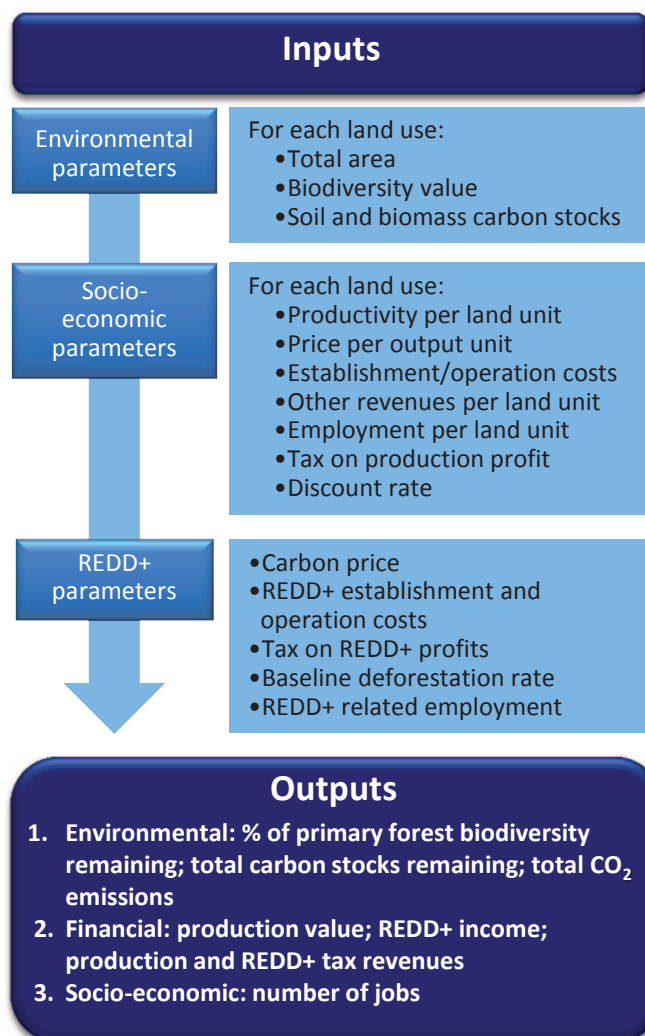
The Land Use Calculator can be used to estimate REDD+ outcomes based on land use allocations to be defined by the user. For these land use configurations, the tool calculates biodiversity loss and carbon emissions as compared to a (user-defined) reference scenario, as well as employment and financial flows of REDD+ benefits and tax revenues. As such, the tool can illustrate synergies and trade-offs between environmental and economic outcomes for various land use configurations, and thus raise awareness of potential REDD+ impacts.

What can it not be used for?

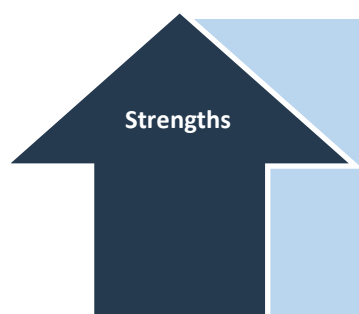
The Land Use Calculator cannot be used to simulate real land use allocations given different economic and policy scenarios. The model is not designed to be spatially explicit. The tool therefore does not provide decision-support on where and how to implement REDD+ so as to realize multiple benefits or address safeguards.

REDD+ activities that can be addressed

✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of the Land Use Calculator?



- Due to user-friendliness it can play an important awareness-raising role.
- Potential REDD+ outcomes given predefined land use configurations can be calculated very quickly.
- Calculations and results can be easily understood.
- The calculations are based on a number of relevant parameters, so that a variety of hypothetical scenarios can be created.
- Everyone can use it as it does not require specific skills or software.



- The quality of results depends on the accuracy of defined land use system parameters; information on these may not be available to the user.
- The model is not spatially explicit and can thus not account for local and regional differences in carbon stocks, relationships of carbon stock with land use, economic production processes, or biodiversity value.
- Calculation of biodiversity outcomes is based only on forest bird species; environmental benefits other than carbon storage and biodiversity are not considered.
- The tool does not allow simulation of how land use would change given different policy and economic scenarios.
- Only financial values (e.g. REDD+ and production profits and tax revenues) are considered.



Expertise?

No specialist knowledge required



Time requirements?

Learning to use the tool: < 1 hour.
Application of the tool: < 1 day.

Further resources:

Land Use Calculator Home Page: <http://landusecalculator.com/>

Acknowledgements

We would like to thank Dr Lian Pin Koh at ETH Zurich for review of this factsheet.

Contact

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Website: <http://www.un-redd.org/tabid/1016/Default.aspx>





REDD Abacus SP Software

<http://www.worldagroforestry.org/sea/abacus>

SCALE:

**Sub-national
to National**



ACCESS:

**OPEN
COMMERCIAL
RESTRICTED**

SOFTWARE-BASED:

**YES
NO**

LANGUAGE:

EN ID VN

What is the REDD Abacus SP Software?

The REDD Abacus SP software can be used to estimate the opportunity costs of REDD+ in a landscape - i.e. the profits that will be foregone if certain types of land use are avoided or given up in order to reduce emissions – and to develop abatement cost curves. These curves show the amount of emission reductions that can be achieved for a certain (opportunity) cost.

What can it be used for in the context of REDD+?

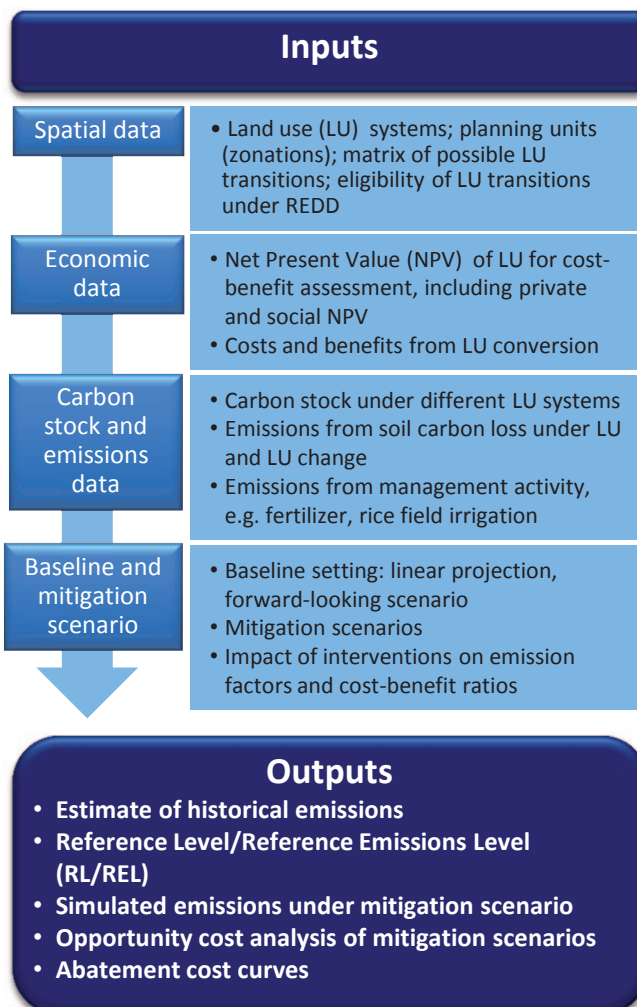
The Abacus software can be used to estimate emissions from land use and land cover changes, based on a consideration of the different soil types, elevations, climate and other biophysical characteristics in the landscape. It can project future emissions and financial gains under a business-as-usual scenario, as well as for a series of what-if scenarios including application of different land use policies in different zones. This information can be used to set a Reference Emissions Level (REL), to analyze trade-offs between emission reductions and financial gain, and to develop a land use plan for low emission development strategies at the province or district level.

What can it not be used for?

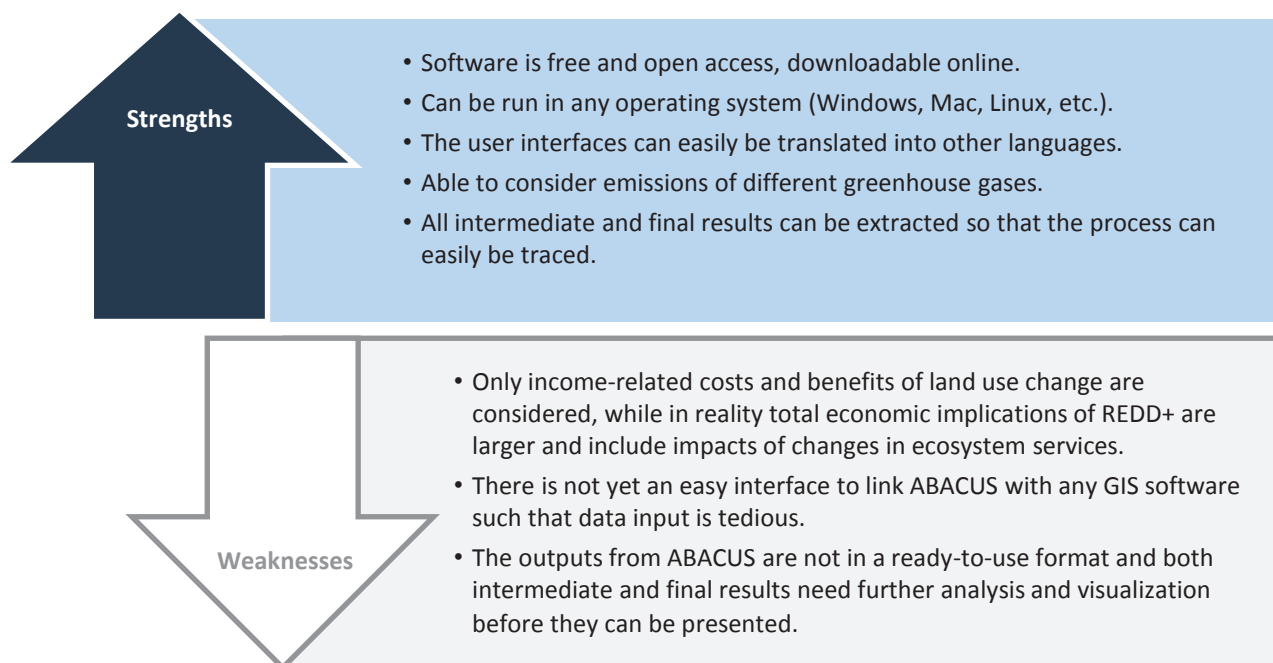
The current Abacus software can not estimate the economic implications of changes in the flow of ecosystem services other than carbon storage, and results are not spatially explicit. The next generation of ABACUS will provide spatially explicit results and address multiple ecosystem services.

REDD+ activities that can be addressed

✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of the REDD Abacus Software?



Expertise?

Some prior knowledge in spatial analysis, opportunity cost analysis and land use planning would be useful although user manual provides explanation and stepwise process



Time requirements?

Learning to use the tool: < 1 week
Application of the tool: 2–3 weeks (can be more depending on data availability)

Further resources:

Abacus Home Page: <http://www.worldagroforestry.org/sea/abacus>

Abacus File list: <http://code.google.com/p/redd-abacus/downloads/list>

Acknowledgements

We would like to thank Degi Harja and Dr Sonya Dewi at the World Agroforestry Centre for their review of this factsheet.

Contact

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Website: <http://www.un-redd.org/tabid/1016/Default.aspx>



World Bank Workbook for estimating opportunity cost of REDD+

<http://wbi.worldbank.org/wbi/document/workbook-estimating-opportunity-costs-redd>

SCALE:

Sub-national
to National



ACCESS:

OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:

YES
NO

LANGUAGE:

EN

What is the World Bank Workbook?

The World Bank Workbook is an Excel-based application that calculates the opportunity costs of REDD+ (i.e. the foregone financial profits from other land use options) and creates opportunity cost curves. These curves represent opportunity costs per ton of CO₂ with the least-cost options on the left and higher costs options to the right. To determine opportunity costs, the tool calculates the cash flows from different land uses over a multiyear period and links them with associated carbon content levels. Then, the profit and carbon levels of the alternative land uses are contrasted with initial (or business as usual) level to generate the opportunity costs. The Workbook contains example spreadsheets for different land use systems that can be customized to local contexts by adjusting parameter values of prices, yields and inputs. Spreadsheet applications for other land use systems can be developed easily.

What can it be used for in the context of REDD+?

This tool has been developed for REDD+ planning. It can illustrate trade-offs between reducing emissions, conservation and enhancement of carbon stocks on the one hand and employment and financial benefits from non-REDD+ land uses on the other. By calculating REDD+ opportunity costs as a component of deriving abatement cost curves, it helps to identify the REDD+ options that can provide carbon benefits most cost-effectively. Other REDD+ co-benefits can be recognized in prioritizing policies or incorporated if financial values are known.

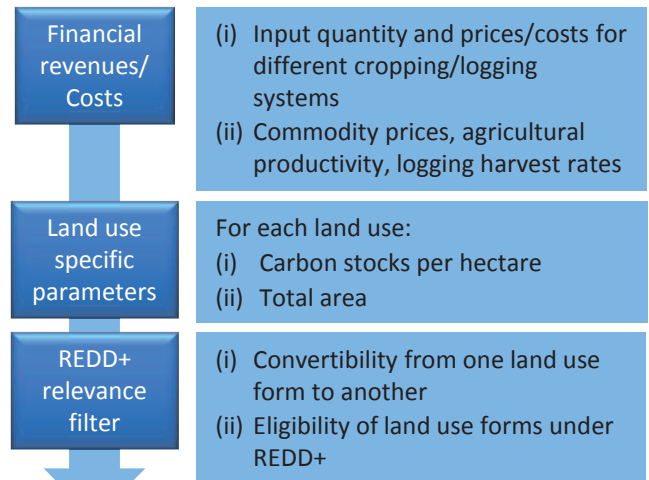
What can it not be used for?

The workbook can generate spatially-explicit analyses of REDD+ opportunity costs, e.g. to take account of spatial variation in productivity of different land use systems. Other elements of REDD+ costs, such as implementation and transaction costs, are not considered. REDD+ benefits can only be evaluated in terms of reduced carbon emissions, but not with regard to other ecosystem services.

REDD+ activities that can be addressed

✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks

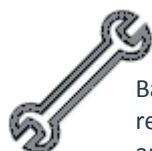
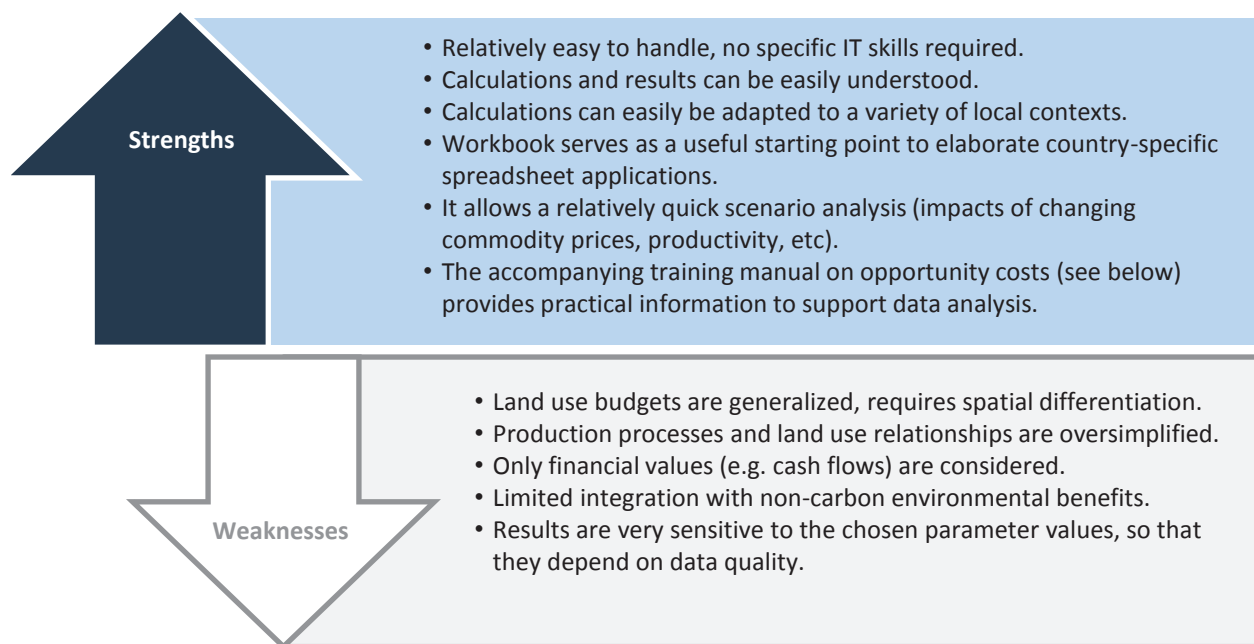
Inputs



Outputs

1. Cash flow of different land use options
2. Graphical analysis of trade-offs between financial benefits (i.e. cash flows), employment (workdays) and carbon benefits (emission reductions)
3. Opportunity cost curves depicting the costs of foregoing forest conversion
4. Overall regional opportunity costs of achieving emission reduction targets

What are the strengths and weaknesses of the World Bank Workbook?



Expertise?

Basic Excel programming skills are required. Some background in economic analysis and land use cost assessments would be useful.



Time requirements?

Learning to use the tool: 1–2 days

Application of the tool: < 1 week

Collection and preparation of input

data: Up to several weeks, depending on data availability

Further resources:

World Bank Training Manual on opportunity costs:

<http://wbi.worldbank.org/wbi/Data/wbi/wbicms/files/drupal-acquia/wbi/OppCostsREDD+manual.pdf>

Acknowledgements

We would like to thank Dr Douglas White at the ASB Partnership for the Tropical Forest Margins for review of this factsheet.

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MARXAN

<http://www.uq.edu.au/marxan/>

SCALE:

**Sub-national
to Global**



ACCESS:

**OPEN
COMMERCIAL
RESTRICTED**

SOFTWARE-BASED:

**YES
NO**

LANGUAGE:

EN

What is Marxan?

Marxan is a decision-support software that was originally developed for designing a cost-efficient protected area network based on a set of user-defined criteria and cost data. Marxan can also be applied to other land use planning exercises, such as identifying areas that are important for REDD+ interventions.

What can it be used for in the context of REDD+?

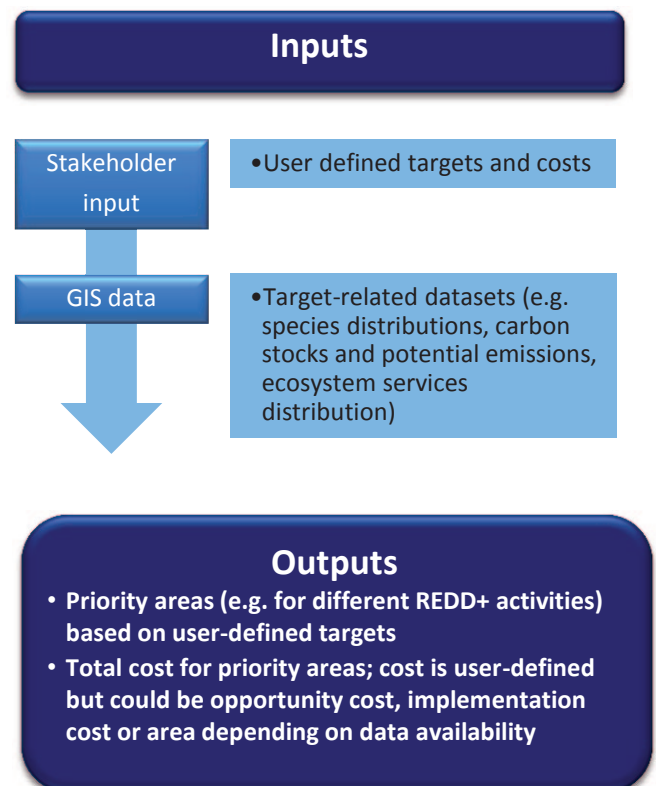
Marxan enables analysis of quantitative spatial data to identify sets of planning units that meet user-defined targets for attributes like carbon stock, biodiversity or ecosystem service provision, at minimal cost and tradeoffs with other targets. Targets can be set for biological, economic and social parameters. Marxan with zones, an extension of Marxan, provides a more comprehensive analysis allowing different management strategies to be prioritized for different land use zones. Marxan can be used for example to identify areas where REDD+ implementation could deliver multiple benefits without incurring high costs.

What can it not be used for?

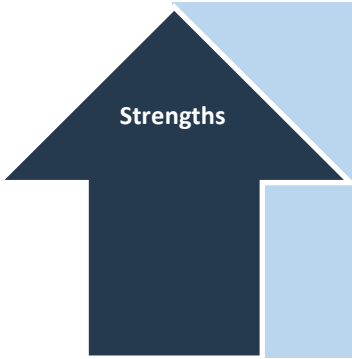
Marxan does not provide 'final answers', rather it provides a range of 'good' solutions to support decision-making. It does not allow consideration of several possible land management strategies (e.g. different REDD+ activities) at the same time, i.e. Marxan cannot set different strategies for different land use zones (but Marxan with zones can). It does not help identify targets, the user must define them.

REDD+ activities that can be addressed

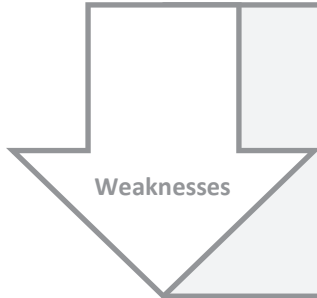
✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of Marxan?



- Very flexible programme, widely used for multiple purposes, good documentation and user support.
- Open access software, downloadable online, compatible with open source GIS software.
- Areas selected as optimal outputs are constrained by user-defined cost.
- Both development and conservation targets can be considered simultaneously in one land use planning exercise.



- The process whereby the output areas are selected may not be easy to follow.
- GIS expertise required.
- Lots of time can be required to both produce and consult on inputs and outputs.



Expertise?

A Marxan exercise should be run with consultation of experts and stakeholders not just by technical staff. GIS knowledge is required.



Time requirements?

Learning to use the tool: ca. 3 weeks
Application of the tool: ca. 10 weeks (including time for stakeholder consultation)

Further resources:

Marxan Home Page: <http://www.uq.edu.au/marxan/index.html>

Marxan Online Tutorial: <http://www.uq.edu.au/marxan/tutorial/toc.html>

Key Marxan References List: <http://www.uq.edu.au/marxan/index.html?page=80365&p=1.1.6.3>

Marxan with zones: <http://www.uq.edu.au/marxan/index.html?page=106743>

Marxan good practice guidance: [http://www.uq.edu.au/marxan/docs/Marxan Good Practices Handbook v2 202010.pdf](http://www.uq.edu.au/marxan/docs/Marxan%20Good%20Practices%20Handbook%20v2%202010.pdf)

Related software and tools: <http://www.uq.edu.au/marxan/index.html?page=77664&p=1.1.7.3>

http://decision-point.com.au/images/DPoint_files/DPoint_62/dp62%20p14%20watts%20marxan.pdf

Acknowledgements

We would like to thank Prof. Hugh Possingham and Matthew Watts at The University of Queensland, Australia, for their review of this factsheet.

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CLUZ (Conservation Land-Use Zoning Software)

<http://www.kent.ac.uk/dice/cluz/index.html>

SCALE:

Site-level to
National



ACCESS:

OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:

YES
NO

LANGUAGE:

EN

What is CLUZ?

CLUZ is an ArcView GIS interface that adds an on-screen planning functionality to the Marxan land use planning software (see Marxan factsheet). Like Marxan, it was originally designed to allow users to implement systematic conservation planning techniques in order to design protected area networks and conservation landscapes.

What can it be used for in the context of REDD+?

CLUZ allows users to import, analyse and display Marxan data. It can therefore be used for REDD+ in the same manner as Marxan but in a more user friendly environment. It allows the user to explore the spatial data required for REDD+ planning and interactively modify a REDD+ landscape plan. Through Marxan, CLUZ can:

- (i) Identify near-optimal landscapes for land use planning that could meet user-defined objectives for a specific REDD+ activity
- (ii) Produce irreplaceability scores for discrete areas in a zoning exercise for a specific REDD+ activity

When planning for REDD+, countries could use this as a support tool to identify areas for implementing REDD+ activities that provide multiple benefits and avoid risks in line with the Cancun safeguards.

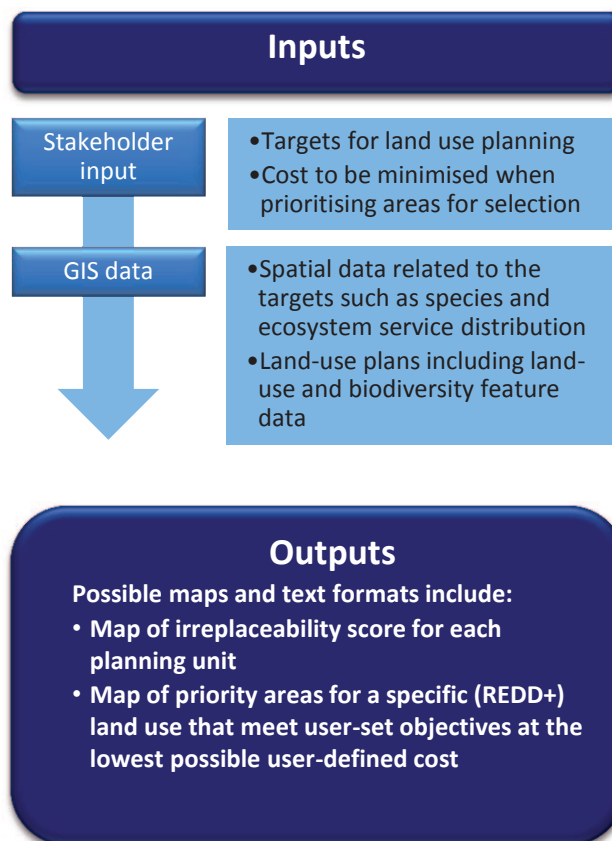
What can it not be used for?

CLUZ is an interface for Marxan, which is land use planning software. It can not create future land use scenarios.

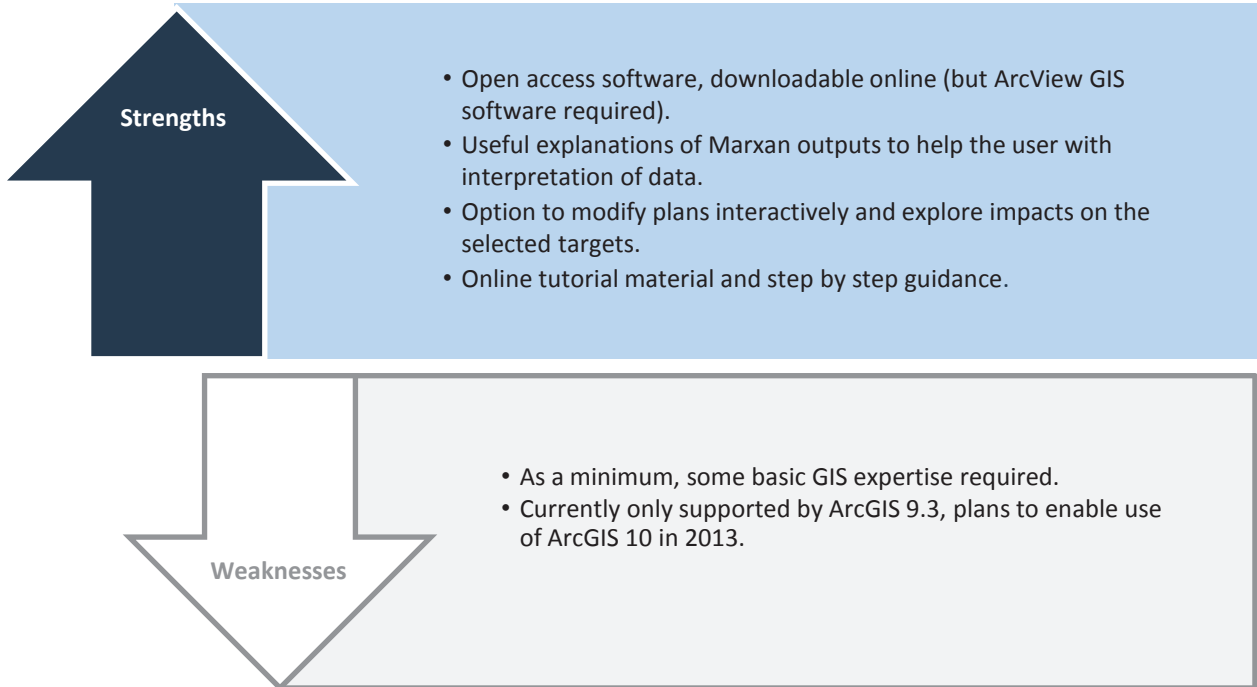
It can only deal with one set of objectives at a time. For example it can not identify priority areas for plantations at the same time as priority areas for protected areas networks.

REDD+ activities that can be addressed

✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of CLUZ?



Expertise?

CLUZ is aimed at planning practitioners and researchers. Some GIS skills are required.



Time requirements?

Learning to use the tool: 2-3 weeks
Application of the tool: ca. 10 weeks (including time for stakeholder consultation)

Further resources:

CLUZ Home Page: <http://www.kent.ac.uk/dice/cluz/>

CLUZ tutorial: <http://www.kent.ac.uk/dice/cluz/tutorial.html>

Marxan Home Page: <http://www.uq.edu.au/marxan/index.html>

Acknowledgements

We would like to thank Dr Bob Smith at DICE, University of Kent, for review of this factsheet.

Contact

Climate Change and Biodiversity Programme

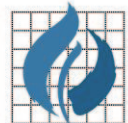
UNEP World Conservation Monitoring Centre

Email: climate@unep-wcmc.org

Website: <http://www.un-redd.org/tabid/1016/Default.aspx>



UNEP



WCMC

CommunityViz

<http://placeways.com/communityviz/>

SCALE:
Site-level to
Sub-national



ACCESS:
OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:
YES
NO

LANGUAGE:



What is CommunityViz?

CommunityViz is a GIS-based decision-support tool that assists users to visualize the implications of different land use choices. Its functions include supporting the development and analysis of scenarios, on-screen sketching of plans, analysis of location suitability and impact assessment. The tool consists of two components which allow for analysis and communication, and also 3D visualisation of results.

What can it be used for in the context of REDD+?

CommunityViz can assist with land use planning to prioritise REDD+ actions and identify suitable locations in relation to identified synergies, trade-offs and needs through scenario development, suitability studies and assessment of impacts on land use, development and conservation goals.

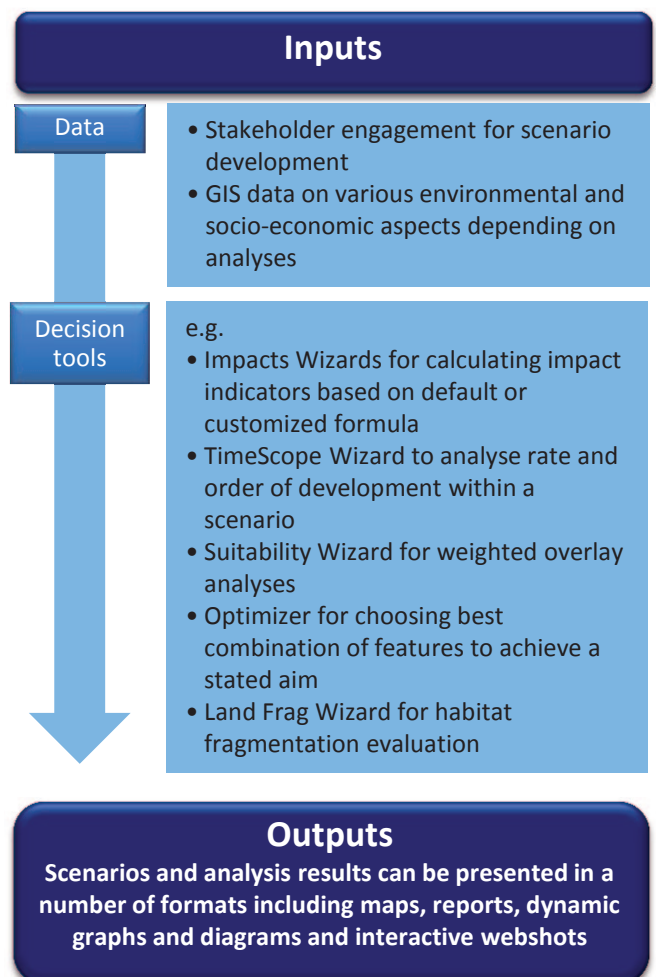
The software can use default and/or customized functions. It includes a Formula Wizard to assist with the creation of customized impact functions. Assumption slider bars are provided as a tool to explore the effects of different assumptions with regard to relevant variables for suitability and impact functions.

What can it not be used for?

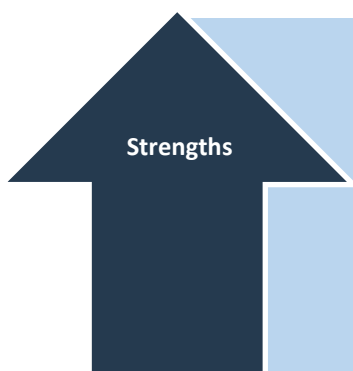
CommunityViz does not have built-in tools for the quantification and valuation of ecosystem services. There are several case studies that demonstrate the applicability of the software for purposes like forest management planning, wildfire risk assessment or water quality management; however its main application is planning of urban and rural settlements. Application in a REDD+ context is likely to require use of the custom modelling environment.

REDD+ activities that can be addressed

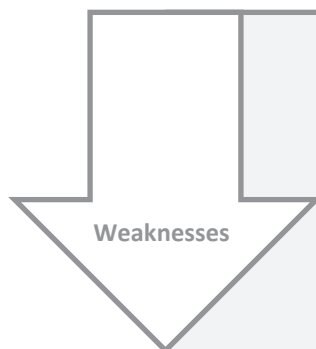
✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of CommunityViz?



- On-line resources including demonstrations, case studies and tutorials.
- Technical support available.
- Specific functions, including an indicator modelling function, support users to apply customized formula in the analyses.
- Economic, environmental, social and aesthetic considerations can be addressed.
- A variety of output formats are available to facilitate communication and stakeholder engagement.



- Only 30 days free trial and then the purchase of a licence is required; using the software also requires Esri ArcGIS Desktop; Windows XP, Vista, or Windows 7; Microsoft.Net Framework 3.5 and above; and DirectX 9.0c.
- Requires intermediate skills in ArcGIS.
- Output quality depends on quality of input data; detailed knowledge of ecological and socio-economic conditions in the study area may be required to customize impact functions.



Expertise?

GIS technical skills are necessary and some knowledge on indicator modelling would be useful



Time requirements?

Learning to use the tool: 2 weeks

Application of the tool: Up to several months, including time for data collection and stakeholder consultations

Further Resources

CommunityViz: <http://placeways.com/communityviz/productinfo/>

Biodiversity and Land-use change case study:

<http://placeways.com/communityviz/gallery/casestudies/pdf/WetTropics.pdf>

Acknowledgements

We would like to thank Doug Walker at Placeways LLC for review of this factsheet.

Contact

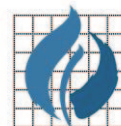
Climate Change and Biodiversity Programme
UNEP World Conservation Monitoring Centre

Email: climate@unep-wcmc.org

Website: <http://www.un-redd.org/tabid/1016/Default.aspx>



UNEP



WCMC



Zonation

<http://www.helsinki.fi/bioscience/consplan/software/Zonation/index.html>

SCALE:
**Site-level
to Global**



ACCESS:
**OPEN
COMMERCIAL
RESTRICTED**

SOFTWARE-BASED:
**YES
NO**

LANGUAGE:
EN

What is Zonation?

Zonation is a conservation planning software that allows for large scale spatial analyses based on data on the distribution of biodiversity features such as species, communities or ecosystems. It enables the identification of areas, or landscapes, that are important for retaining habitat quality and connectivity for multiple species or ecosystems, implicitly aiming at the long-term persistence of biodiversity. Zonation can also identify ecologically low-value areas where economic development can take place with limited impact. The types of questions that Zonation can address include:

- Identification of optimal areas for new reserves or reserve extensions, as well as areas of low conservation value
- Priority ranking balancing needs of alternative land uses
- Planning across multiple administrative regions with different priorities
- Target-based planning

The outputs produced by Zonation can be incorporated into wider land use planning.

What can it be used for in the context of REDD+?

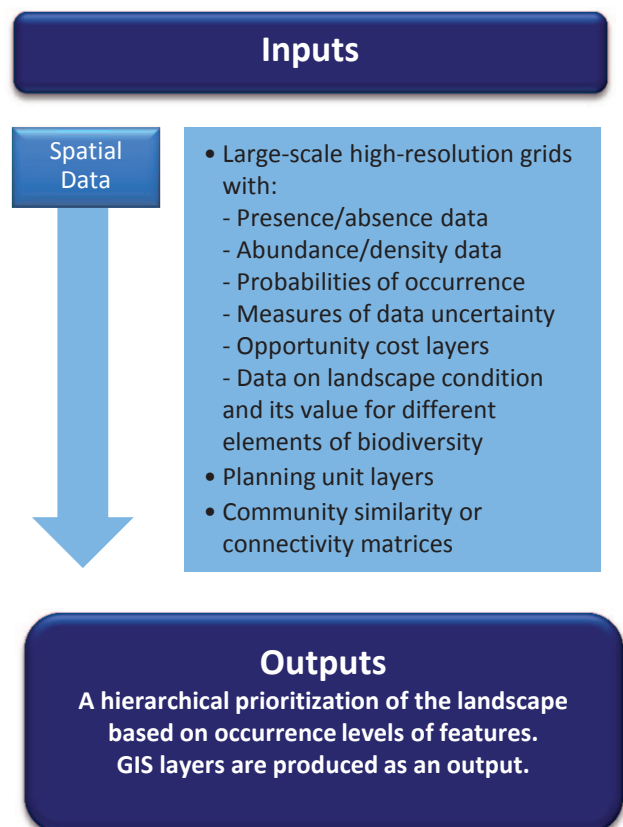
Zonation can provide a simultaneous analysis of carbon, biodiversity features and opportunity costs. It can thus assist in the planning of economically feasible REDD+ interventions that are consistent with biodiversity conservation in line with the Cancun safeguards, enhancing biodiversity benefits and avoiding risks to biodiversity that could arise from certain types of REDD+ interventions.

What can it not be used for?

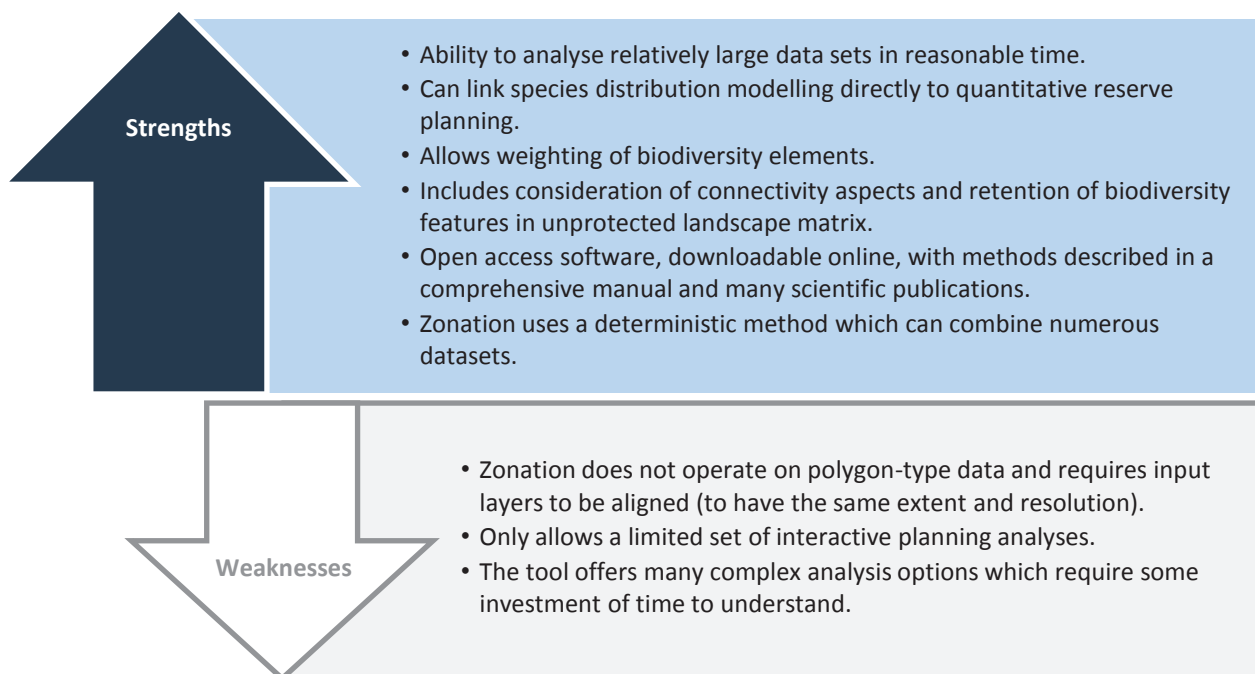
Zonation is primarily intended for binary-type problems (whether an area should be protected/restored or not). It is not meant for the direct (near-optimal) targeting of multiple alternative conservation actions, like for example MARXAN with zones. While Zonation can identify priority areas for biodiversity conservation, it does not provide recommendations on their management. If management scenarios have been developed separately, this information can be accounted for in the analysis.

REDD+ activities that can be addressed

✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of Zonation?



Expertise?

Zonation is a standalone software and can be operated without GIS, however some GIS expertise and knowledge of statistical distribution modelling is beneficial at the stage when inputs to Zonation are developed



Time requirements?

Learning to use the tool: The basics of the software can be learnt quickly (1 day), however deeper understanding can take months, depending on prior expertise with distribution modelling and planning software

Application of the tool: Assuming input data has been developed in advance, usually < 1 week, depending on grid size and quality of input data

Further resources:

Home Page: <http://www.helsinki.fi/bioscience/consplan/software/Zonation/index.html>

Software: <http://consplan.it.helsinki.fi/software/projects/zonation/>

Manual: <http://www.helsinki.fi/bioscience/consplan/software/Zonation/>

References:

Chris D Thomas, Barbara J Anderson, Atte Moilanen, Felix Eigenbrod, Andreas Heinemeyer, Tristan Quaife, David B Roy, Simon Gillings, Paul R Armsworth and Kevin J Gaston. 2012. Reconciling biodiversity and carbon conservation. *Ecology Letters*, early online: 20 DEC 2012 | DOI: 10.1111/ele.12054

See also: http://www.helsinki.fi/bioscience/consplan/software/Zonation/References_new.html

Acknowledgements

We would like to thank Prof. Atte Moilanen and Dr Federico Montesino Pouzols at the University of Helsinki for their review of this factsheet.

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Benefit and Risks Tool (BeRT)

http://www.un-redd.org/Multiple_Benefits/SEPC_BeRT/tabid/991/Default.aspx

SCALE:
National



ACCESS:
OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:
~~YES~~
NO

LANGUAGE:
EN

What is the BeRT?

The Benefit and Risks Tool (BeRT) has been developed to support application of the UN-REDD Social and Environmental Principles and Criteria (SEPC). These Principles and Criteria are a guiding framework for addressing social and environmental issues in UN-REDD National Programmes and other UN-REDD funded activities, and for supporting countries in developing national approaches to REDD+ safeguards in line with the UNFCCC.

What can it be used for in the context of REDD+?

The BeRT helps users to assess the potential risks and benefits of a national REDD+ programme. It has, in the first instance, been developed to apply the SEPC in the formulation of national programmes. It is structured around the criteria of the SEPC. For each Criterion, a set of primary “yes/no” questions are asked. Each primary question is elaborated through a set of guiding questions, which help to arrive at the answer to the primary question and provide a more comprehensive basis for identifying risks and opportunities. Links to relevant resources are also provided.

The BeRT questions may also be of use in an existing national programme to analyse policies in-country relevant to REDD+ safeguards, and to identify needs for further policy development to meet the safeguards. However, the current tool is designed for programme development.

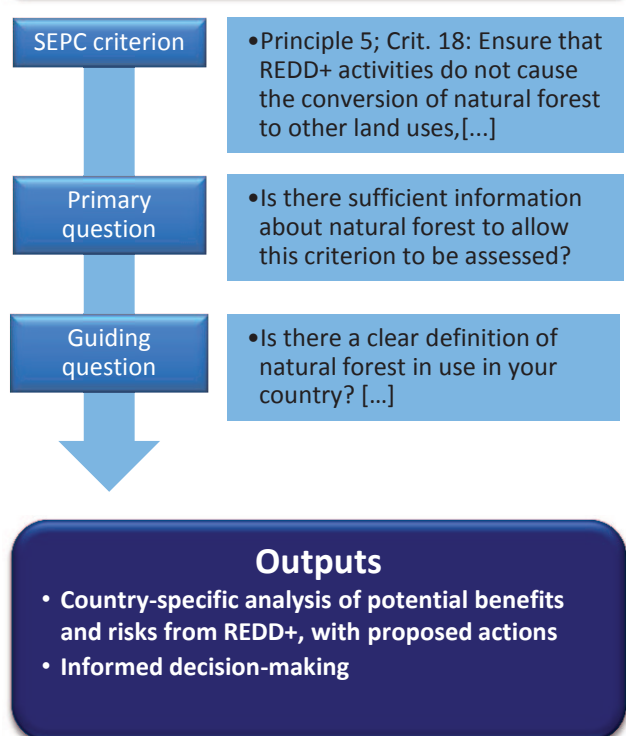
What can it not be used for?

BeRT is a decision-support tool that relies on the good judgement of its users and does not prescribe specific solutions.

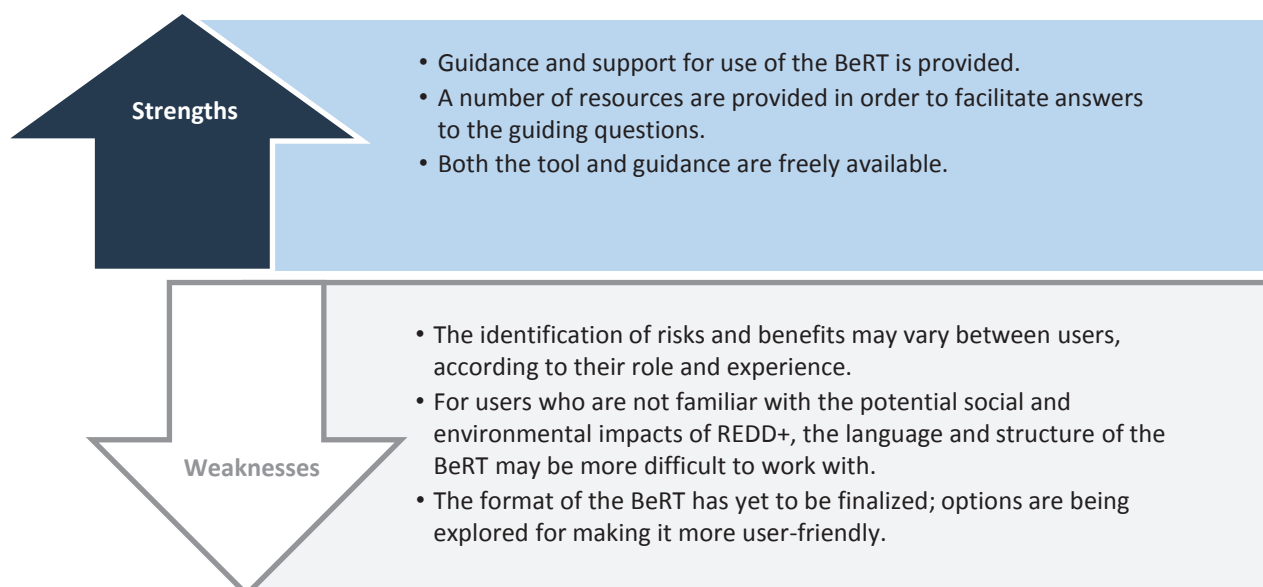
REDD+ activities addressed

✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks

Example of primary and guiding question:



What are the strengths and weaknesses of the BeRT?



Expertise?

No specialist knowledge required; using the tool may identify questions for which further expertise is required



Time requirements?

Learning to use the tool: < 1 day
Application of the tool: < 1 week

Further resources:

Home Page: http://www.un-redd.org/Multiple_Benefits/SEPC_BeRT/tabid/991/Default.aspx

BeRT user guide and tool download:

http://www.unredd.net/index.php?option=com_docman&task=doc_download&gid=6380&Itemid=53

The UN-REDD Social and Environmental Principles and Criteria:

http://www.un-redd.org/Multiple_Benefits_SEPC/tabid/54130/Default.aspx

Acknowledgements

We would like to thank Dr Lera Miles at UNEP-WCMC for review of this factsheet.

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Social and Biodiversity Impact Assessment (SBIA) Manual for REDD+ Projects

http://climate-standards.org/documents/social_biodiversity.html;
http://www.forest-trends.org/publications/sbia_manual/

SCALE:

Site-level to
National



ACCESS:

OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:

YES
NO

LANGUAGE:



What is the SBIA Manual?

The SBIA Manual aims to assist those involved in the design and implementation of land-based carbon projects to conduct cost-effective and credible social and biodiversity impact assessment, and monitor the ways in which their projects affect local biodiversity and the livelihoods of people living in and around the project site. The publication was developed in the context of the Climate, Community and Biodiversity (CCB) Standards but is intended to be useful for a wide range of project settings. Part 1 sets out a suggested participatory process for impact assessment. A Social Impact Assessment Toolbox (Part 2) and a Biodiversity Impact Assessment Toolbox (Part 3) provide further detail on specific methods and tools.

What can it be used for in the context of REDD+?

The materials can help with cost-effective project planning, monitoring and adaptive management including consideration of social and biodiversity impacts, risks and benefits, through guidance on:

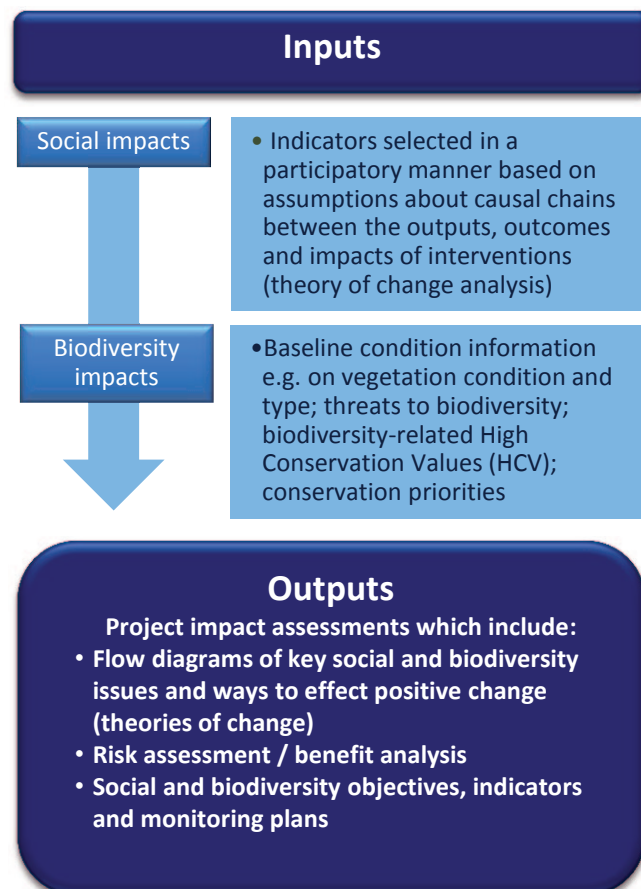
- Identification of “without-project” scenario conditions
- Design of project activities and estimation of impacts
- Indicator development
- Monitoring methodology
- Stakeholder analysis

What can it not be used for?

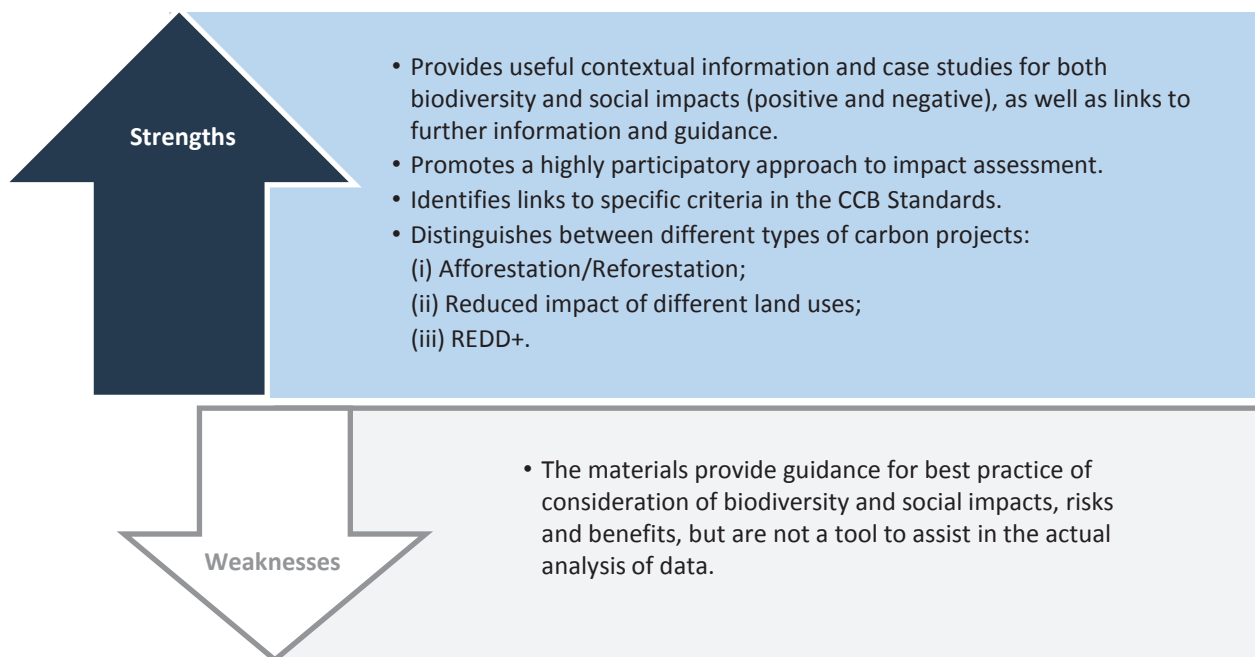
The SBIA Manual is not a comprehensive guide to different approaches to social and biodiversity impact assessment, and does not provide guidance on quantitative or statistical impact assessment methods or economic cost-benefit analyses.

REDD+ activities that can be addressed

✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of the SBIA Manual?



Expertise?

The guidance is aimed at project developers and assessment practitioners



Time requirements?

Learning to use the tool: < 1 week
Application of the tool: < 6 months
(varies with project)

Further resources:

SBIA Manual for REDD+ Projects Home Page:

http://climate-standards.org/documents/social_biodiversity.html or
http://www.forest-trends.org/publications/sbia_manual/

Building Forest Carbon Projects - Biodiversity Impact Guidance:

http://www.forest-trends.org/documents/files/doc_2871.pdf

Acknowledgements

We would like to thank Dr Michael Richards at Forest Trends and Dr Steven Panfil at Conservation International for their review of this factsheet.

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CBD Guidelines on Biodiversity-inclusive Impact Assessment

<http://www.cbd.int/doc/publications/imp-bio-eia-and-sea.pdf>

SCALE:

Site-level to
National



ACCESS:

OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:

YES
NO

LANGUAGE:

EN

What are the CBD Guidelines?

The Voluntary Guidelines on Biodiversity-inclusive Impact Assessment that were endorsed by the Conference of the Parties to the Convention on Biological Diversity (CBD) (Decision VIII/28) and the accompanying background document provide guidance on whether, when and how to consider biodiversity in impact assessments both at the project level (Environmental Impact Assessment, EIA) and the level of strategies or programmes (Strategic Environmental Assessment, SEA). They draw on the experiences of the project on Capacity-Building for Biodiversity and Impact Assessment (CBBIA) of the International Association for Impact Assessment.

What can they be used for in the context of REDD+ ?

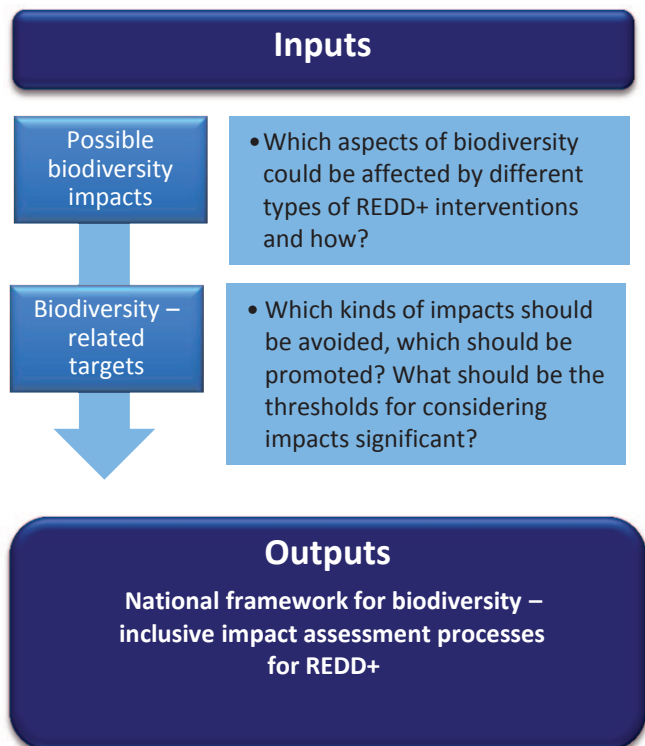
The CBD Guidelines can inform the design of assessments of the possible impacts of REDD+ strategies, programmes or projects on biodiversity, thus supporting the achievement of multiple benefits from REDD+ in line with the Cancun safeguards and the requirements of the Convention on Biological Diversity.

What can they not be used for?

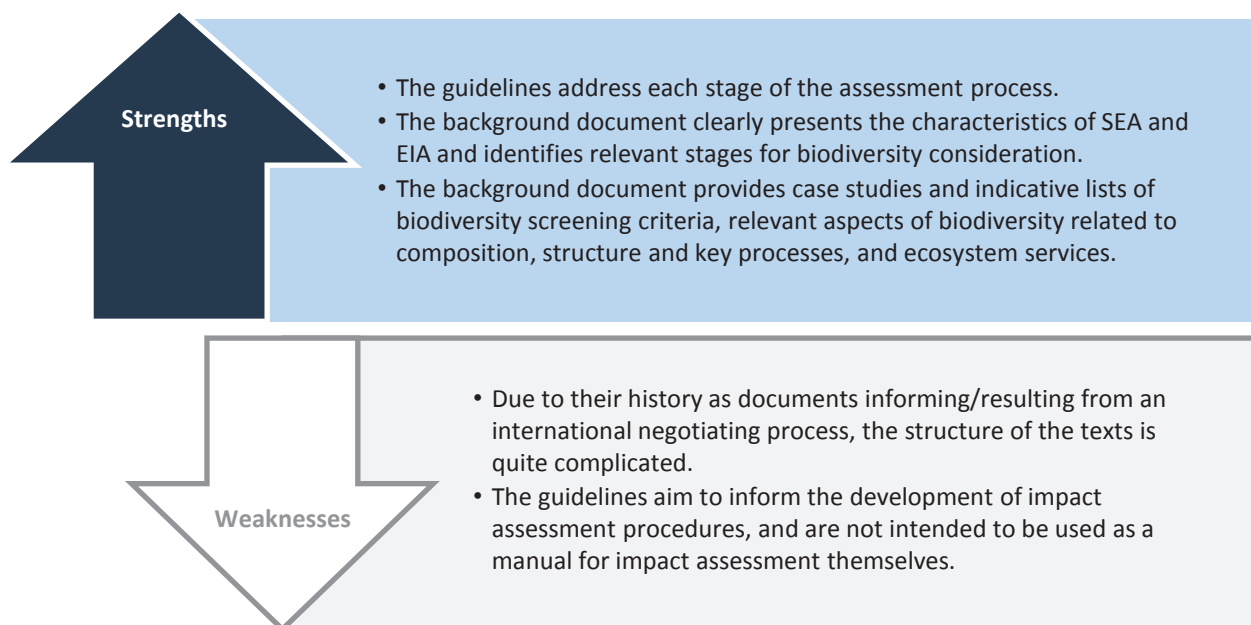
The CBD Guidelines should not be used as the only source of information in designing biodiversity-inclusive impact assessments, but should be considered together with existing national regulations on impact assessment.

REDD+ activities that can be addressed

✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of the CBD Guidelines and the accompanying background document as a tool for REDD+ planning?



Expertise?

Some technical knowledge of impact assessment processes and knowledge on potential biodiversity impacts of different land use options is required



Time requirements?

Learning to use the tool: 1–2 days (for users with previous understanding of impact assessment)

Application of the tool: from several days up to several months, depending on magnitude of activity and impacts, and public consultation needs

Further resources:

IAIA Principles for Biodiversity in Impact Assessment:

[http://www.eiatoolkit.ewt.org.za/documents/Biodiversity/Biodiversity%20in%20Impact%20Assessment%20-%20IAIA%20Special%20Publication%20Series%20no.%203%20\(July%202005\).pdf](http://www.eiatoolkit.ewt.org.za/documents/Biodiversity/Biodiversity%20in%20Impact%20Assessment%20-%20IAIA%20Special%20Publication%20Series%20no.%203%20(July%202005).pdf)

References

1. Sloomweg, R., Rajvanshi, A., Mathur, V. B., Kolhoff, A. 2009. Biodiversity in Environmental Assessment – Enhancing Ecosystem Services for Human Well-Being. Ecology, Biodiversity and Conservation. 456 p. www.cambridge.org/9780521888417

Acknowledgements

We would like to thank Dr Roel Sloomweg at Sloomweg en van Schooten, the Netherlands, for review of this factsheet.

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CBD Lessons Learned Report on Developing Ecosystem Service Indicators

<http://www.bipindicators.net/LinkClick.aspx?fileticket=QxjjDuqt2Qk%3d&tabid=155>

SCALE:

**Sub-national
to International**



ACCESS:

**OPEN
~~COMMERCIAL~~
~~RESTRICTED~~**

SOFTWARE-BASED:

**~~YES~~
NO**

LANGUAGE:

EN

What is the CBD Lessons Learned Report on Ecosystem Service Indicators?

The CBD Lessons Learned Report on Developing Ecosystem Service Indicators aims to promote improved understanding of ecosystem services by using indicators. It focuses on the practical details of monitoring and measuring ecosystem services at scales that are relevant for policy and management, providing guidance and recommendations on indicator development and use.

The manual is based on a review of experiences and lessons learned from the development of ecosystem service indicators within a range of assessment processes and research initiatives.

What can it be used for in the context of REDD+?

The report can help those who are involved in the development of REDD+ strategies and programmes to identify appropriate indicators in order to:

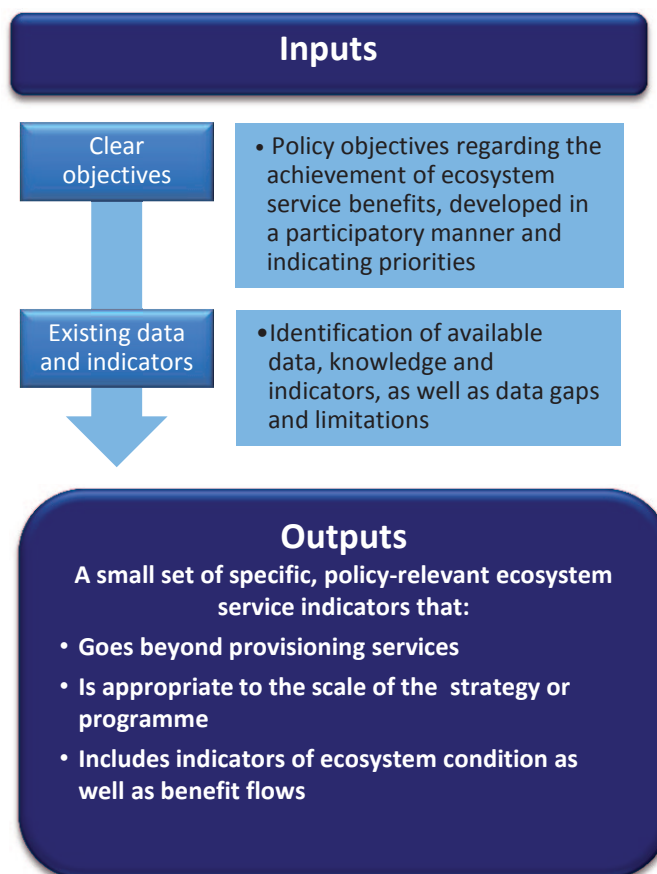
- Assess current and potential provision of ecosystem services to inform planning for multiple benefits from REDD+; and
- Monitor the impacts of REDD+ on ecosystem services to support adaptive management and provide information on how REDD+ safeguards are addressed and respected.

What can it not be used for?

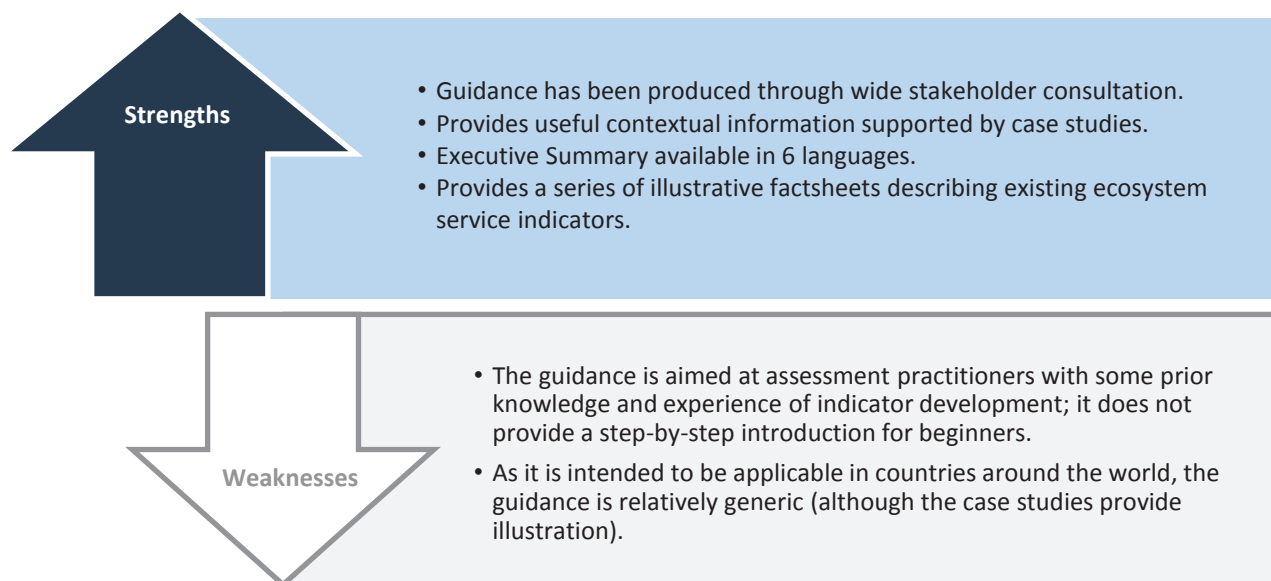
The report does not provide ready-made solutions – it rather describes the issues that should be considered and makes recommendations on how to address them; it does not deal in detail with methods of ecosystem service valuation.

REDD+ activities that can be addressed

✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of the CBD Lessons Learned Report on Developing Ecosystem Service Indicators?



Expertise?

Some knowledge of the ecosystem service concept, indicators, and assessment / monitoring processes would be useful



Time requirements?

Learning to use the tool: < 1 day
Application of the tool: ca. 10 weeks (including time for review of available data and stakeholder consultation)

Further resources:

National Biodiversity Indicators Portal : www.bipnational.net

BIP Guidance for National Biodiversity Indicator Development and Use:
<http://www.bipindicators.net/guidancedocumentsforationaluse>

Acknowledgements

We would like to thank Dr Claire Brown at UNEP-WCMC for review of this factsheet.

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Biodiversity Indicators Partnership (BIP) Guidance for National Biodiversity Indicator Development and Use

<http://www.bipindicators.net/guidancedocumentsforationaluse>

SCALE:
National



ACCESS:
OPEN
COMMERCIAL
RESTRICTED

SOFTWARE-BASED:
~~YES~~
NO

LANGUAGE:



What is the BIP National Biodiversity Indicators Guidance?

This guidance is designed to help with the development and use of biodiversity indicators at the national level for purposes such as policy-making, environmental management, reporting, and education. It addresses the steps of identifying key questions and clarifying objectives, generating indicators, and developing a monitoring system that applies the selected indicators.

What can it be used for in the context of REDD+?

The guidance can help those who are involved in the development of REDD+ strategies and programmes to identify appropriate indicators in order to:

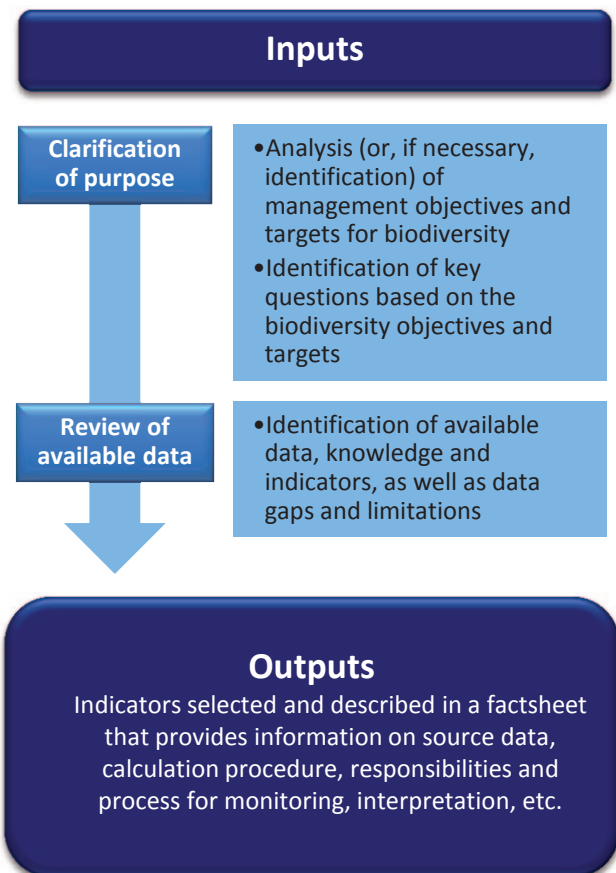
- Assess the current status of biodiversity to inform planning for multiple benefits from REDD+; and
- Monitor the impacts of REDD+ on biodiversity to support adaptive management and provide information on how REDD+ safeguards are addressed and respected.

What can it not be used for?

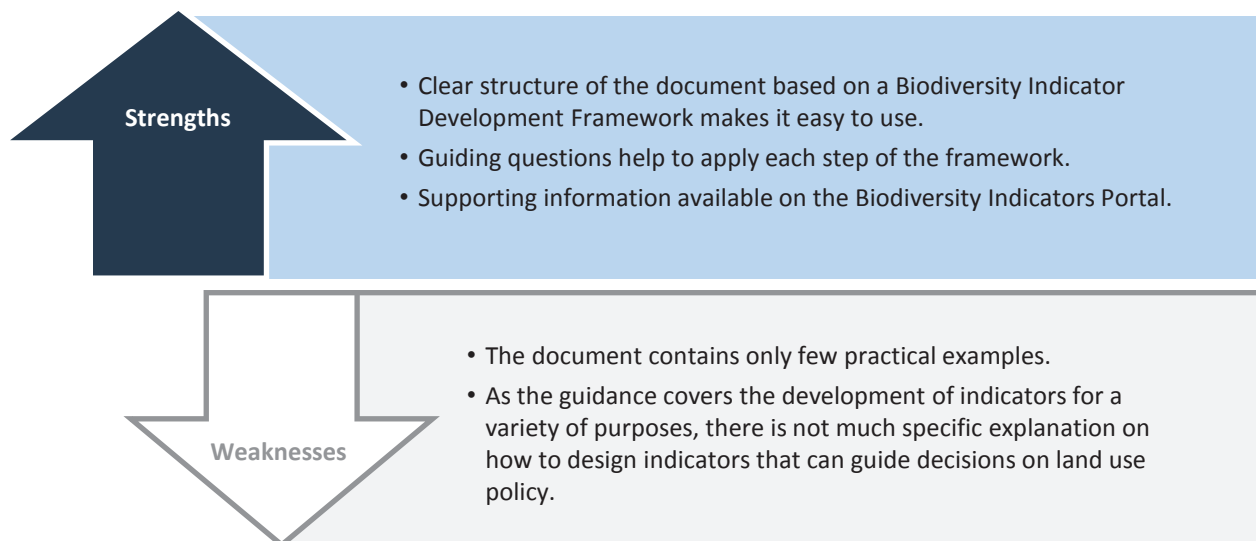
The guidance focuses on the process of producing and using indicators, rather than technical aspects such as choosing appropriate measures of biodiversity, designing a sampling strategy or developing a method for data interpretation. It does not provide examples of possible indicators, data sources or interpretation methods.

REDD+ activities that can be addressed

✓	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
✓	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of the BIP Guidance for National Biodiversity Indicator Development and Use?



Expertise?

To apply the guidance, some basic ecological knowledge and knowledge of biodiversity monitoring methods is needed



Time requirements?

Learning to use the tool: < 1 day

Application of the tool: Several weeks (including time for data review and stakeholder consultations)

Further resources:

Biodiversity Indicators Portal: www.bipnational.net

Biodiversity Indicators Partnership (BIP) Ecosystem Services Indicator Manual:

<http://www.bipindicators.net/LinkClick.aspx?fileticket=QxjjDuqt2Qk%3d&tabid=155>

Acknowledgements

We would like to thank Philip Bubb at UNEP-WCMC for review of this factsheet.

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CIFOR Criteria and Indicators Toolbox series

<http://www.cifor.org/acm/pub/toolbox.html>

SCALE:

**Sub-national
to National**



ACCESS:

**OPEN
COMMERCIAL
RESTRICTED**

SOFTWARE-BASED:

**YES
NO**

LANGUAGE:



What is the Criteria and Indicators Toolbox series?

The Criteria and Indicators Toolbox is a series of nine tools and resources aimed at helping users to develop and assess criteria and indicators for sustainable and equitable forest management, with a focus on criteria and indicators that are suitable for application in sustainability monitoring at the level of forest management units, especially in tropical countries. The series contains a mix of guidance and templates, as well as software to assist with the process of selection and customisation. The materials provided cover environmental, social and economic aspects of forest management.

What can it be used for in the context of REDD+?

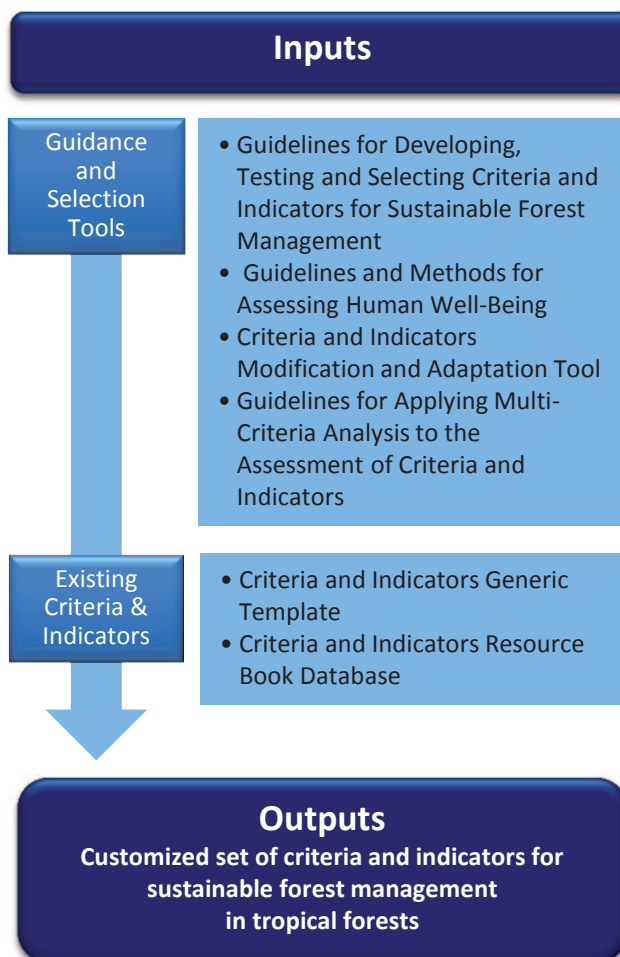
The identification of appropriate criteria and indicators for sustainable forest management can contribute to the long-term success of efforts to reduce emissions from forest degradation and to maintain and enhance carbon stocks in managed forests, as well as to the achievement of multiple benefits and avoidance of risks from REDD+ in line with the Cancun safeguards.

What can it not be used for?

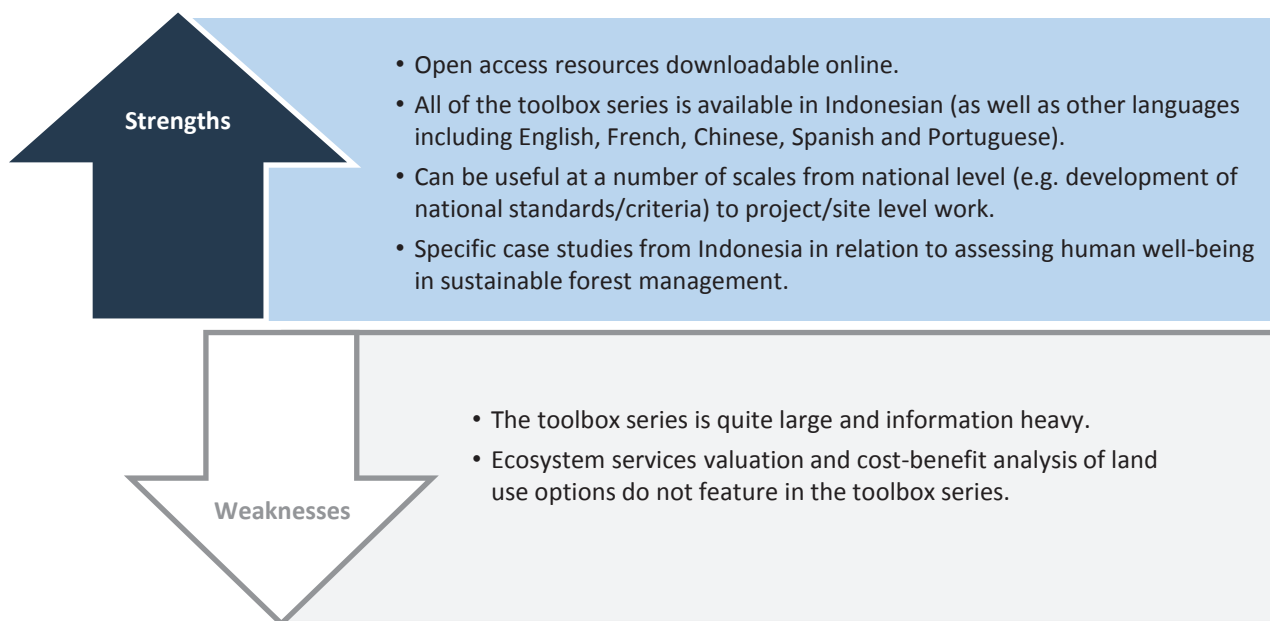
The toolbox series does not specifically address criteria and indicators for delivery of ecosystem services or their value, or for impacts of forest management that occur outside the forest management unit (such as displacement effects).

REDD+ activities that can be addressed

	Reducing emissions from deforestation
✓	Reducing emissions from forest degradation
	Conservation of forest carbon stocks
✓	Sustainable management of forests
✓	Enhancement of forest carbon stocks



What are the strengths and weaknesses of the Criteria and Indicators Toolbox series ?



Expertise?

The tools have been designed to suit different levels of expertise in environmental or social science. Some knowledge of forest management issues is required.



Time requirements?

Learning to use the tool: < 1 week

Application of the tool:

This can range from a few days to several months, depending on level of previous knowledge, scope of indicator selection and whether consultation is required

Further resources:

C&I Toolbox Series Home Page: <http://www.cifor.org/acm/pub/toolbox.html>

Criteria and Indicators Modification and Adaptation Tool: Prabhu, R., Haggith, M., Purnomo, H., Rizal, A., Sukadri, D., Taylor, J. and Yasmi, Y. 2000. CIMAT (Criteria and Indicators Modification and Adaptation Tool) – VERSION 2. Criteria & Indicators Toolbox Series No. 3. CIFOR, Bogor, Indonesia. CDROM and user manual.

Acknowledgements

We would like to thank Dr Carol Colfer at the Center for International Forestry Research (CIFOR) for review of this factsheet.

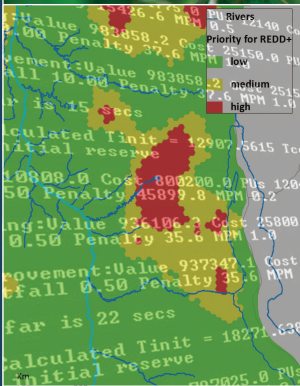
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A wide range of tools and resources is available to assist decision-makers and their advisors in planning for REDD+ implementation. As these materials have been developed with different problems and decision-making contexts in mind, it can be difficult to identify the ones that are most suitable in a specific situation. This document is a guide to some of these tools and resources, with a particular focus on those which take account of the multiple values of forests and can support the design of REDD+ interventions that provide climate change mitigation as well as other social and environmental benefits.

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UN-REDD
PROGRAMME



The Ministry of Forestry
 Republic of Indonesia