



UN-REDD Programme Asia-Pacific Regional Workshop: Supporting planning for REDD+ activities through spatial analysis

UN-REDD PROGRAMME

Workshop Report

*A workshop convened by the United Nations
Environment Programme (UNEP)*

*Wednesday 9th October – Friday 11th October 2013,
Bangkok, Thailand*

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 September 2008 to assist developing countries prepare and implement national REDD+ strategies, and builds on the convening power and 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 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.

Prepared by Robert Munroe, Charlotte Hicks, Lucy Goodman, Stephen Woroniecki, Agnes Hallosserie, and Lera Miles

Copyright: UN-REDD Programme

Copyright release: This publication may be reproduced for educational or non-profit purposes without special permission, provided acknowledgement to the source is made. Re-use of any figures is subject to permission from the original rights holders. No use of this publication may be made for resale or any other commercial purpose without permission in writing from UNEP. Applications for permission, with a statement of purpose and extent of reproduction, should be sent to the Director, UNEP-WCMC, 219 Huntingdon Road, Cambridge, CB3 0DL, UK.

Disclaimer: The contents of this report do not necessarily reflect the views or policies of UNEP, contributory organisations or editors. The designations employed and the presentations of material in this report do not imply the expression of any opinion whatsoever on the part of UNEP or contributory organisations, editors or publishers concerning the legal status of any country, territory, city area or its authorities, or concerning the delimitation of its frontiers or boundaries or the designation of its name, frontiers or boundaries. The mention of a commercial entity or product in this publication does not imply endorsement by UNEP.

Should readers wish to comment on this document, they are encouraged to get in touch via: ccb@unep-wcmc.org.

Citation: Munroe, R., Hicks, C., Goodman L., Woroniecki, S., Hallosserie, A., Miles, L., (2013). Supporting planning for REDD activities through spatial analysis. Workshop Report. Prepared on behalf of the UN-REDD Programme. UNEP World Conservation Monitoring Centre, Cambridge, UK.

Acknowledgements: With thanks for comments and input to colleagues Ben Vickers, Joel Skriven, Akihito Kono, and Thomas Enters, and to the participants: A.S.M Jahir Uddin Akon, Tashi Wangchuk, Long Ratanakoma, Heng Hong, Henry Barus, Savanh Chanthakoumane, Roslina Nordin, Batbold Dorigurkhem, Phone Htut, Resham Dangi, Ina Karissa Tobias, Joe Pokana, Terence Titiulu, Fred Patinson, W.D.P Gomas, Suchitra Changtragoon, Suwan Pitaksintorn, Narin Chakjum, Somyoi Saengnin, Chingchai Viriyabuncha, Pung Nam Thang, Kanwar Muhammed Javed Iqbal, Tunga Bhadra Rai, Veerachai Tanpipat, Shengkham Inthiravongsy, Tran Van Chau, Marija Spirovska Kono, and Arthur Neher.



Summary

On 9-11 October, the Asia-Pacific regional workshop "Supporting planning for REDD+ activities through spatial analysis" was held in Bangkok, attended by 36 participants from 15 countries, alongside civil society and indigenous peoples' representatives. The aim of the workshop was to enhance knowledge on spatial analysis so that participants can advance their countries' work to address multiple benefits in REDD+ strategy development and planning of REDD+ demonstration activities.

After a series of participatory exercises, national experience sharing sessions and technical clinics, participants left with an enhanced understanding of how spatial information can support decisions on REDD+ action location, free global spatial datasets relevant for assessing the potential for multiple benefits, and ways in which local stakeholders can effectively participate in the collection, validation and reporting of land-use, forest and biodiversity related data for spatial analysis. Moreover, participants engaged in exercises to identifying the risks and benefits of different REDD+ actions and how they vary spatially, resources related to spatial REDD+ planning, and the role of economic analyses in assessing the spatial variation in REDD+ costs and benefits.

Identified future needs by countries during the workshop included:

- The need for resources to support economic analyses for REDD+ planning
- To hold similar workshops at the national level
- To provide further insight into how spatial information can be used to consider REDD+ action implementation costs and opportunity cost
- Further facilitation of South-South learning.

Countries expressed significant satisfaction with the workshop content and format. The presentations from the workshop can be found [here](#).

Table of contents

Day 1 – Why The Locations of REDD+ Activities Matter	5
<i>Break-out session – Identifying the possible environmental and social risks and benefits of different REDD+ actions for different stakeholders</i>	6
<i>Break-out session – Identification of priority areas where REDD+ actions could enhance multiple benefits</i>	6
Day 2 – Spatial Planning To Enhance Benefits From REDD+	8
<i>Break-out session – Alternative approaches to presenting the results of spatial analysis for REDD+</i>	8
Day 3 – Clinics	11
<i>Plenary session – Feedback and next steps from each participant</i>	12
Workshop Evaluation	13
Participants list.....	14
Annex 1 – Example outputs from Clinic 1 ‘How local stakeholders can effectively participate in collecting and validating data, and how spatial analysis can also be used to help enhance participation in decision making?’	16
Appendix 1 – A selection of relevant international sources of spatial data that could be useful for REDD+ planning..	17

Day 1 – Why The Locations of REDD+ Activities Matter

Three presentations introduced REDD+ activities and actions:

Lucy Goodman	5 REDD+ activities described in 1/CP.16 UNFCCC and their relationship to REDD+ actions and an introduction to the benefits from REDD+
Thomas Enters	National Readiness strategies from across the region
Long Ratanakoma	Preparations for pilot/demonstration actions – case study from Seima, Cambodia

These were followed by a presentation summarising the last UN-REDD Regional Workshop:

Kanwar Iqbal	Summary of 3rd UN-REDD Regional Lessons Learned Workshop: Social and Environmental Safeguards, Bangkok, Thailand, 5-6 March 2013
--------------	--

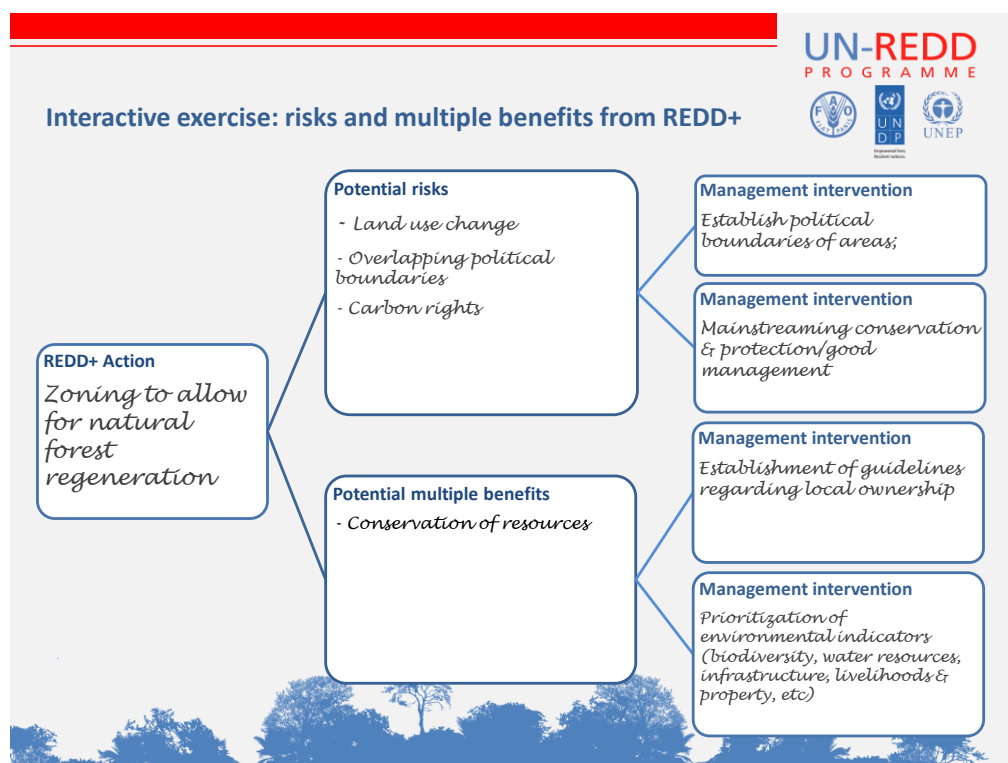


In the discussions on the presentations the following points emerged:

- Presentations provided examples of REDD+ activities, actions, national strategies, country case studies and safeguards that spatial planning could support
- REDD+ Safeguards workshops are needed for civil society and indigenous peoples at national/sub-national level in the region
- The need to consider trade-offs between prioritising different REDD+ benefits
- The need for clarification between multiple benefits (that includes carbon) and co-benefits (everything else)

Break-out session – Identifying the possible environmental and social risks and benefits of different REDD+ actions for different stakeholders.

The aim of this session was to support participants to identify risks and benefits for a given REDD+ action, and provide example management interventions to mitigate those risks and enhance those benefits. Participants were asked to choose one REDD+ action from a list of example actions from REDD+ strategy documents from across the region. As risks and benefits were identified for each action chosen, participants were asked to focus on considering whether spatial analysis interventions would be a useful management intervention.



Break-out session – Identification of priority areas where REDD+ actions could enhance multiple benefits.

The purpose of this exercise was to help participants visualize that different REDD+ actions are appropriate in different locations and under different conditions, and that potential benefits vary according to the place and the way in which the activity is implemented. The exercise gives an idea of how REDD+ spatial planning might take these factors into account. It also helps participants to understand the potential functions of spatial information and the limitations of available data.

Participants were split into groups using datasets from Viet Nam and Tanzania and focusing on actions that were chosen for the previous exercise (1x Viet Nam extending a protected area network to reduce deforestation, 1x zoning to allow for natural forest regeneration, 2x Tanzania extending a protected area network to reduce deforestation). Participants in each group were asked to choose between example map layers for use in deciding on locations for a REDD+ action, and ultimately develop a decision-support map from a combination of selected layers. This was followed by identifying on the map areas where further investigation could take place for determining the suitability of the location for the chosen REDD+ action.

The groups were required to provide feedback on their choice of layers and areas, and to highlight what layers would have been useful given availability. Key discussions points that arose include:

- The need for more forward-looking spatial information that include scenarios/projections
- Areas for further investigation of the applicability of REDD+ actions need to be informed by where deforestation and degradation pressures are
- The need for the prioritization of benefits or risks to address
- Many datasets are desirable to inform REDD+ planning – how much time and money do we want to spend creating these?
- Incorporating land use or socioeconomic development plans into such maps would be useful
- Base layer choices (e.g. present biomass carbon v natural forest area) are fundamental to influencing the choice of priority areas



Day 2 – Spatial Planning To Enhance Benefits From REDD+

This day aimed to provide participants with an overview of current tools and approaches for spatial data analysis and presentation for planning to enhance REDD+ benefits, and to discuss countries' experiences in this area. The day started with an overview presentation from Robert Munroe emphasising that the opportunities to implement a particular REDD+ action, the possibilities of planning for additional benefits and addressing risks and minimizing costs, all vary with location. The second presentation, by Joel Scriven, explained how a range of National Forest Monitoring System tools can support spatial analysis for the applicability of particular REDD+ actions. This was followed by Lucy Goodman who gave an overview of what is covered in the GIS working sessions conducted by the UN-REDD Programme to produce mapping products tailored to answering specific planning questions.

Three countries held focus groups on their experiences of REDD+ spatial planning or the use of spatial tools. Henry Barus presented on the criteria used to prioritise districts in Central Sulawesi for REDD+ activities. Phung Nam Thang and Thomas Enters presented on Viet Nam's experience of a provincial planning approach to REDD+ implementation. Joe Pokana presented on Papua New Guinea's experiences of developing a National Forest Monitoring Portal. Key points raised from the discussions between the three groups included:

- Developing maps is important for a participatory approach to prioritising areas for REDD+ (Central Sulawesi experience)
- Developing maps can be a lengthy process, and their utility is dependent on the quality of data which is very context dependent – the use of satellite information from internet portals may be the only option (Central Sulawesi experience)
- Spatial planning for REDD+ can potentially improve the incorporation of REDD+ activities in economic plans (Central Sulawesi experience)
- Using maps to identify sub-districts for REDD+ activities is a useful first step to focus attention (Viet Nam experience)
- Need to focus on costs as well as benefits (Viet Nam experience)
- A National Forest Monitoring System web portal can build relationships with stakeholders, through capacity building, open access and transparent provision of data (PNG experience)
- Different spatial information tools are necessary for different REDD+ Phases (general)

Break-out session – Alternative approaches to presenting the results of spatial analysis for REDD+

This session aimed to develop the participants' understanding of the utility of different approaches to presenting spatial information for REDD+ planning, the importance of framing REDD+ spatial planning questions in an appropriate way for technicians to analyse, and the limitations of GIS analysis. Participants were divided into 3 groups – 2x land-use planners, 1x GIS technicians. Participants were asked to discuss their priority REDD+ spatial planning questions and to then identify what information is needed to address these questions. The questions were then rephrased so that they would be clear to GIS technicians. The utility of three forms of spatial information presentation (static maps, interactive PDFs and online portals) was discussed by the land-use planners groups, including on the basis of whether the forms of presentation would be appropriate for addressing the priority questions identified. Meanwhile, the GIS technicians group learnt how to use QGIS to run analyses useful for REDD+ planning, e.g. how much carbon is stored in a site, what is the overlap between an area of interest for a REDD+ action and areas of importance for biodiversity? They also tried to use QGIS to address some of the priority questions raised by the land-use planning groups.

During the feedback session, the land-use planners groups were asked to explain their priority REDD+ spatial planning questions. These included:

Priority spatial planning for REDD+ multiple benefits:

- Where is the potential for accelerated soil erosion?
- Where is high forest fragmentation?
- How can [a REDD+ action] contribute to poverty alleviation?
- How can [a REDD+ action] contribute to adaptation?
- Where can [a REDD+ action] be located to reduce conflict between local people and protected areas?
- Where will REDD+ enhance biodiversity conservation?
- What additional information is required to incorporate REDD+ activities into local government development spatial plans?

These groups also discussed the perceived utility (benefits and limitations) of the different forms of spatial information presentation and suggested ways in which they could be improved.

Format	Utility
Static maps – maps produced for brochures	When will they be updated? Need strong institutional arrangements to facilitate constant update
	Limits to the number of layers need to be applied (no need for carbon base layer on every map)
	Legends need to be clear, terms need to be clearly defined
	Accessible to rural areas
	Only if participatory procedure for development and verification is undertaken
'Interactive PDFs' – the layers of the maps produced for brochures presented in PDF form, allowing the turning on/off of layers	Only if presented in local languages
	Makes user interact with information
	Useful for verification – can be sent out easily to many stakeholders as the file size is reduced
National Forest Monitoring System Portal	Do not need GIS to interpret
	Can serve as a clearing house/central location for a variety of information, e.g. socioeconomic
	Can develop country ownership/empowerment
	Attractive user-interface
	User rights to change information can be managed, could have a temporal 'window' where owners of the data could be allowed to update it
	Can link to archiving – electronic dataset can be transferred
Not always appropriate for community use given reliance on internet	

The GIS technicians group explained the steps they would go through to address a selection of the priority questions developed by the land-use planners groups.

Two broad approaches to addressing questions from decision makers were discussed:

- 1) Presentation of a series of spatial proposals for decision makers to choose from, associated with explicit costing and the risks and benefits of each.
- 2) Presentation of a single solution that can be used to raise awareness on, or support decisions on, a specific element of REDD+ planning, for example biodiversity.

Within the group, there was also an opportunity to exchange different GIS software. It was raised that while open source software has the advantages of being freely available without the need for expensive commercial licences, commercial software often has better remote support for bugs and fixes.

A final important point raised in the GIS session was the difficulty of incorporating social issues into GIS analysis for REDD+, both because of the lack of datasets, and because of the need for local surveys to inform REDD+ planning.

Day 3 – Clinics

Participants attended two of the following three technical clinics:

1. 'How local stakeholders can effectively participate in collecting and validating data, and how spatial analysis can also be used to help enhance participation in decision making';
2. 'Free global spatial datasets available for REDD+ planning that enhance multiple benefits';
3. 'Economic analyses for REDD+'.

Participants were asked to fill out customised 'next step' forms that included a summary of the clinic, together with space to record proposed next steps, useful information gathered from the clinic, remaining questions and names of resource persons to contact in the future on the topic.

1. In this clinic on stakeholder participation, participants were asked to discuss the following seven themes/questions:

- i. Existing practice in your country where local stakeholders participate in collection of information (including but not limited to REDD+)
- ii. How could existing practice be applied to REDD+?
- iii. What local data might be missing without local engagement at a national level?
- iv. Who can help collect, validate and report on such data?
- v. What technical guidance and technologies are required?
- vi. How can contributing to REDD+ planning maps empower people?
- vii. How can local scale maps support REDD+ implementation?

After small group and whole group discussion, a table (see annex 1) capturing comments and answers was prepared and used to formulate an approach to ensuring effective stakeholder engagement in carrying out a spatial analysis for national REDD+ planning and other related activities in REDD+.

2. In Clinic 2, participants worked on a list of potential benefits that REDD+ can be expected to achieve in their country. To this list, ideas were added on what maps would be relevant for REDD+ planning to be able to consider these benefits. The session covered potential categories of information that it is relevant to map for REDD+ planning, and key international sources of data that can be used when sufficient national data is not available. These sources are captured in the appendix 1 'A selection of relevant international sources of spatial data that could be useful for REDD+ planning'.

More examples of the practical use of spatial information at REDD+ pilot sites were requested, as was more time to give participants the opportunity to explore the databases mentioned individually.

3. Designed for non-economists, this clinic introduced the role of economic analyses to help inform national REDD+ planning, recognizing that costs and benefit values vary with location. An introduction to different types of economic analyses was given, e.g. direct market valuation (basic level of analysis), revealed preferences (advanced level of analysis), stated preferences (advanced), and benefit transfer (basic). Participants used hypothetical economic data to undertake a basic cost-benefit study. Participants also compared their results and explored issues surrounding economic analyses, including what benefits would they prioritize for valuation studies and why (influence of policies), and what would be done if economic figures were not available/accurate.

More information on how to actually undertake different types of economic analyses relevant to REDD+ planning was requested.

Plenary session – Feedback and next steps from each participant

Participants were asked to answer the following questions:

1. What insights were gained?
2. What questions still remain?
3. What will participants be recommending to national colleagues as a result of the workshop?

1. Participants acknowledged the opportunity to learn about the free biodiversity datasets available, to consider how to work with GIS to address policy maker's needs, learning from the Viet Nam and Central Sulawesi experiences, and considering the use of cost-benefit analysis in REDD+ planning, as particular highlights.

2. More insight into how to collect relevant information and assess its accuracy would have been welcomed. Deeper exposure to spatial analysis tools would have been welcomed by some participants. Specific unanswered questions included: How are we going to measure other benefits in the context of result-based payments?

Whether UN-REDD Programme will be developing a toolkit for spatial analysis, step-by-step guidance for the prioritisation of areas for certain REDD+ actions, and a decision-making tool to consider cost-benefits in REDD+, were also raised. The soon to be launched sub-section of the www.un-redd.org section on Multiple Benefits that offers a guide to steps that ensure REDD+ delivers benefits and that risks are reduced will provide some support on the former. Some workshop participants gained exposure to this webpage during the exercise on Day 2 'Alternative approaches to presenting the results of spatial analysis for REDD+' in which the search engine on useful tools was trialled. Regarding a decision-making tool to consider cost-benefits in REDD+, the economic analyses for REDD+ publication soon to be released by UNEP-WCMC, should serve this need. It will provide an introduction and rationale to carrying out economic analyses, an inventory of tools available, and guidance on how the results can be used in determining optimal REDD+ strategies.

3. IPs and CSO recommendations to national colleagues will include: the optimisation of the freely available datasets profiled for considering REDD+ benefits and the need for a dedicated network of UN-REDD Programme regional CSOs.

Country participants will be calling, for example, for the investigation into the costs of different spatial analysis tools [profiled](#), the need for regional platforms on specific REDD+ issues, and the need for economic analyses to inform REDD+ planning.

Workshop Evaluation

General Perceptions of the Workshop

The extent to which the workshop generally met participant's expectations was reflected in an average score of 7.5/10 (17 responses). Respondents reflected that it had practical value, helped to increase capacity, share countries' lessons learnt, and raise awareness of necessary steps for particular countries and of potential challenges.

The utility of the workshop for developing spatial analysis skills and tools was reflected in an average score of 7.8/10 (16 responses). There was a sense that the GIS tools on offer are immensely valuable for developing in-country REDD+ capacity, awareness of additional REDD+ benefits, and how it can help with national strategy planning. There were some concerns about lack of GIS capacity in order to implement such analyses, and lack of availability of data specific to particular countries. One participant questioned whether spatial analysis was always relevant for REDD+ countries to undertake

Feedback on topics covered and knowledge gained

There were clear trends in how participants felt about the topics covered. The economic analysis clinic was mentioned most often as being exceptionally useful. Furthermore the profiling of mapping and spatial planning tools was also felt to be very valuable (for example, when liaising with policy-makers). The clinic on freely available global datasets for mapping activities was popular, and the discussion on open-source software for forest monitoring was also mentioned as useful. The workshop has, according to respondents, increased awareness of where countries can go to get relevant spatial information, which was identified as being particularly useful for informing national priorities and identifying areas for potential implementation of REDD+ actions to enhance REDD+ benefits. Furthermore, respondents stated that demonstration activities (including the clinics) were very valuable. No participants felt that the topics covered were unhelpful.

Workshop Venue, Organisation, and Suggestions

Participants rated the venue and organisation 9.1/10 and 9/10 respectively, on average. The organisers were praised specifically for the quality of the facilitation and level of interaction. Only a limited number of critiques were levelled; the needs and requirements of particular countries would ideally be catered for, as countries differ markedly in their level of preparedness and environments. There was a suggestion that targeted in-country workshops on a similar theme would be useful. Participants also suggested that a greater focus on case studies and field experiences, including challenges faced and overcome, would have been useful.

Participants list

Home Country	Name	Position/Affiliation
Bangladesh	A.S.M Jahir Uddin Akon	Deputy Conservator of Forests, Training and Education Wing, Forest Department
Bhutan	Tashi Wangchuk	Forestry Officer from Social Forestry Division, Department of Forest and Park Services
Cambodia	Long Ratanakoma	Deputy Director of Forest and Community Forestry Department
Cambodia	Heng Hong	Regional and Rural Development Planning
Indonesia	Henry Barus	Agrotechnology Department of Agricultural Faculty, University of Tadulako
Lao PDR	Savanh Chanthakoumane	UN-REDD Focal Point, Director of REDD+ Office, Department of Forestry
Malaysia	Roslina Nordin	Environmental Management and Climate Change Division (PASPI), Ministry of Natural Resources and Environment
Mongolia	Batbold Dorjgurkhem	Director of International Cooperation Division of the Ministry of Environment and Green Development, UN-REDD Focal Point
Myanmar	Phone Htut	Staff Officer, Planning and Statistics Division, Forest Department
Nepal	Resham Dangi	UN-REDD National Focal Point, Ministry of Forest and Soil Conservation
Philippines	Ina Karissa Tobias	Planning and Project Management Service Division of the Forest Management Division
Papua New Guinea	Joe Pokana	Senior Policy Analyst – MRV, Office of Climate Change and Development
Solomon Islands	Terence Titiulu	Deputy Commissioner, Forest Resource, Management and Technical Services Division, Ministry of Forest and Research
Solomon Islands	Fred Patinson	Programme Manager, Solomon Islands UN-REDD Project, UNDP Sub-Office
Sri Lanka	W.D.P. Gomas	Research Officer, Forest Department
Thailand	Suchitra Changtragoon	Expert on Forest Conservation Research, Department of National Parks, Wildlife and Plant Conservation
Thailand	Suwan Pitaksintorn	Senior Scientist, Department of National Parks, Wildlife and Plant Conservation
Thailand	Narin Chakjum	Forest Technical Officer on Remote sensing and GIS
Thailand	Somyoj Saengnin	Forest Technical Officer in Forest inventory , Department of National Parks, Wildlife and Plant Conservation
Thailand	Chingchai Viriyabuncha	Forest Technical Officer on Carbon Estimation and Long Term Ecological Sampling Plot Monitoring, Department of National Parks, Wildlife and Plant Conservation
Viet Nam	Phung Nam Thang	Vietnam Forestry University

UN-REDD Programme Asia-Pacific Regional Workshop:
Supporting planning for REDD+ activities through spatial analysis – Workshop Report

CSO ¹	Kanwar Muhammad Javed Iqbal	CSO Observer, Asia-Pacific, Sustainable Development Policy Institute
IP ²	Tunga Bhadra Rai	Program Officer, Nepal Federation of Indigenous Nationalities Climate Change and REDD Partnership Program

Institution	Name	Position/Affiliation
LEAF ³	Veerachai Tanpipat	GIS/Remote Sensing Officer
LEAF	Shengkham Inthiravongsy	Forest and Climate Change Adviser
LEAF and SNV	Tran Van Chau	Forest and Climate Change Specialist, Technical Assistance on Spatial Analysis for Provincial REDD+ Action Planning in Vietnam
SilvaCarbon	Marija Spirovska Kono	Coordinator, SilvaCarbon Southeast Asia Programme
FAO	Ben Vickers	UN-REDD Regional Coordinator for Asia and the Pacific, FAO Office in Bangkok
FAO	Joel Scriven	Forestry Officer, UN-REDD Programme, FAO Office in Bangkok
UNDP	Akihito Kono	Regional Technical Adviser - UN-REDD and UNDP-GEF Ecosystems and Biodiversity, Asia-Pacific Regional Centre
UNDP	Arthur Neher	Programme Manager, PNG UN-REDD Programme
UNEP	Thomas Enters	UN-REDD Programme Coordinator for Asia-Pacific
UNEP-WCMC	Charlotte Hicks	Programme Officer, Climate Change and Biodiversity Programme
UNEP-WCMC	Lucy Goodman	Programme Officer, Climate Change and Biodiversity Programme
UNEP-WCMC	Robert Munroe	Programme Officer, Climate Change and Biodiversity Programme

¹ Civil Society Organisation representative

² Indigenous People representative

³ Lowering Emissions in Asia's Forests

Annex 1 – Example outputs from Clinic 1 ‘How local stakeholders can effectively participate in collecting and validating data, and how spatial analysis can also be used to help enhance participation in decision making?’

	Roles by local stakeholders?	Existing practice	How could existing practices be applied to REDD+?	Local data missing without local engagement at a national level	Who can help to collect, validate, report on data? (Private sector, forest comm. NGOs)	How can contributing to REDD+ planning maps empower people?	What technical guidance and technologies are required?	How can local scale maps support REDD+ implementation?	Any challenges?
Thailand	Non-timber forest products (NTFPs) – discussion with local people	No existing practice; but local co-management, water user groups	Thailand River Basin Commissions or water user groups could contribute to REDD+ in watersheds?	NTFPs +market chain; drivers of deforestation	Private sector (e.g. consultants); academic sector; university	Communication of problems to planners; learn new skills	Paper questionnaire; GPS; training	More accurate; shows activities/drivers on the ground	Lack of existing practice to build on
Lao PDR	Role of local community and provinces by forestry law, and customary law	Land-use planning, biodiversity inventory and survey	Benefit sharing model from payment for ecosystem service schemes (PES) in production forest	Boundary between village, mapping; key biodiversity	Project based: SIDA, World Bank, IUCN	Limited capacity	Training courses: GIS, planning	Help to clarify boundaries between villages	
Mongolia		Biodiversity monitoring by local stakeholders is in their interest	Use win-win solution	Any data (at fine scale)	Who has traditional knowledge: citizens, NGOs, GOs, private companies etc	People would have more confidence because they work for themselves	Simple methods and techniques		To find out economic gain and environmental gain at the same time

Appendix 1 – A selection of relevant international sources of spatial data that could be useful for REDD+ planning

National data is likely to be more relevant where it exists, but where detailed national data is lacking, global or international data sources can be useful for providing spatial data for REDD+ planning. The below table contains a selection of relevant data sources.

Spatial database	Description	Link	Notes (what maps relevant to your country could this data be useful for?)
Major databases			
UNEP Environmental Data Explorer	The Environmental Data Explorer is the authoritative source for data sets used by UNEP and its partners in the Global Environment Outlook (GEO) report and other integrated environment assessments. Its online database holds more than 500 different variables, as national, subregional, regional and global statistics or as geospatial data sets (maps), covering themes like freshwater, population, forests, emissions, climate, disasters, health and GDP.	http://geodata.grid.unep.ch	
FAO	FAO's main data portal on the topics under its mandate, containing data on 119 topics in 198 countries, including 44 datasets, 22 databases, 234 000 maps, and 59 000 pictures.	http://data.fao.org	
FAO	Core spatial datasets relevant to forests and climate change	http://www.fao.org/climatechange/54267/en	
CGIAR Centers - GeoSpatial Sites	The 15 CGIAR International Research Centers provide spatial data for sustainable agricultural development.	http://csi.cgiar.org/MapServices.asp	
UNData	Has databases on, for example education, finance, health, human development, industry, information and communication technology, population, refugees, tourism and trade	http://data.un.org	
Ecosystem carbon stocks			
Above-ground biomass carbon	Pan-tropical forest carbon mapped with satellite and field observations. Source: Woods Hole Research Center. Lead researcher: Alessandro Baccini	http://www.whrc.org/mapping/pantropical/carbon_dataset.html	
Above-ground biomass carbon	Forest carbon stocks in tropical regions across three continents. Source: NASA. Lead researcher: Sassan Saatchi	http://carbon.jpl.nasa.gov/data/dataMain.cfm	
Soil carbon	Global carbon in soils to 1m depth based on the Harmonized World Soil Database (HWSD)	Not yet available for download. Contact UNEP-WCMC at climate@unep-wcmc.org	
Biodiversity and ecosystems			
The IUCN Red List of Threatened Species	The IUCN Red List of Threatened Species™ provides taxonomic, conservation status and distribution information on plants and animals that have been globally evaluated using the IUCN Red List Categories and Criteria. This system is designed to determine	http://www.iucnredlist.org	

	<p>the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight those plants and animals that are facing a higher risk of global extinction (i.e. those listed as Critically Endangered, Endangered and Vulnerable). The IUCN Red List also includes information on plants and animals that are categorized as Extinct or Extinct in the Wild; on taxa that cannot be evaluated because of insufficient information (i.e., are Data Deficient); and on plants and animals that are either close to meeting the threatened thresholds or that would be threatened were it not for an ongoing taxon-specific conservation programme (i.e., are Near Threatened).</p>		
Important Bird Areas	<p>Important Bird Areas (IBAs) are key sites for bird conservation – small enough to be conserved in their entirety and often already part of a protected-area network. They do one (or more) of three things:</p> <ul style="list-style-type: none"> • Hold significant numbers of one or more globally threatened species • Are one of a set of sites that together hold a suite of restricted-range species or biome-restricted species • Have exceptionally large numbers of migratory or congregatory species 	Needs to be requested from ian.may@birdlife.org	
Key Biodiversity Areas	<p>Key Biodiversity Areas extend the Important Bird Area (IBA) concept and aim to other taxonomic groups and are also identified using globally standardised criteria. They are being identified for a range of animal and plant groups, on land, in freshwater and at sea.</p>	Needs to be requested from ian.may@birdlife.org	
Protected areas	<p>The World Database on Protected Areas is a foundation dataset for conservation decision making. It contains information from national governments, non-governmental organizations, academic institutions, international biodiversity convention secretariats and many others, providing spatial information on countries' national protected area system</p>	http://www.protectedplanet.net	
GBIF	<p>The Global Biodiversity Information Facility is a network of governments and international organizations, collaborating with a Secretariat to provide information about all forms of life on Earth for research and policy. GBIF users have free access to more than 10,000 datasets published by over 450 institutions, ranging from zoological and botanical collections to observations by citizen scientists and surveys from research expeditions.</p>	http://www.gbif.org	
Mangroves of West and Central Africa	<p>Landcover / Land Use: This regional dataset shows the distribution of mangroves and was compiled by UNEP-WCMC through processing of Landsat TM 5 and Landsat 7 ETM+ images dating predominantly from 1999-2001. These data were published in association with the UNEP-Regional Seas Programme in the report: "Mangroves of Western and Central Africa" written and compiled by Emily Corcoran, Corinna Ravilious and Mike Skuja. (June 2007).</p>	http://data.unep-wcmc.org/datasets/8	
Wetlands	<p>This dataset shows the global distribution of wetlands. It was produced at UNEP-</p>	http://www.unep-wcmc.org/global-	

	WCMC from various sources alongside the publication 'Wetlands in Danger"', Dugan, P ed. (1993).	wetlands-1993 719.html	
Pressures			
Petroleum Dataset v 1.2	The petroleum datasets contain information on all known oil and gas deposits throughout the world. Two datasets are available: one for on-shore deposits and another for off-shore deposits. Version 1.1 represents a slight update of the original dataset where some variables have been renamed to increase consistency and missing fields have been assigned a unique missing value. Version 1.2 represent a further update of the dataset. The Codebook, Country profiles, and List of sources remain unchanged.	http://www.prio.no/Data/Geographical-and-Resource-Datasets/Petroleum-Dataset	
Diamond Resources	The diamonds dataset offers a comprehensive list of all known diamond deposits throughout the world. Each deposit is coded with precise geographic coordinates, geological form of the diamond, and dates of discovery and first production.	http://www.prio.no/Data/Geographical-and-Resource-Datasets/Diamond-Resources	
MODIS burnt area product	MODIS Burned Area Product: The MCD45A1 Global Burned Area Product.	http://modis-fire.umd.edu/BA_getdata.html#Download_2	
Burnt area dataset	The provisional version of the global product and the validation results are made available for download and evaluation.	http://bioval.jrc.ec.europa.eu/products/burnt_areas_L3JRC/GlobalBurntAreas2000-2007.php	
Population	Mapping global urban and rural population distributions: Global Rural-Urban Mapping Project, version 1 (GRUMPv1)	http://sedac.ciesin.columbia.edu/gpw/global.jsp	
Population	AfriPop: detailed gridded spatial population datasets showing age composition by 5-year groupings and gender. Contemporary data from national censuses, census microdata and household surveys are combined to quantify the subnational age and gender structures of African populations across the continent, and used to adjust existing AfriPop population distribution datasets. Moreover, the collation of subnational inter-censal growth rates enables production of 2000, 2005, 2010 and 2015 datasets to support Millennium Development Goal related assessments, amongst others.	http://www.clas.ufl.edu/users/atatem/index_files/Data.htm	
Other			
WorldClim	WorldClim is a set of global climate layers (climate grids) with a spatial resolution of about 1 square kilometer. The data can be used for mapping and spatial modeling in a GIS or with other computer programs.	http://www.worldclim.org/download.htm	
Global Agro-Ecological Zones	Includes: <ul style="list-style-type: none"> • Land and water resources, including soil resources, terrain resources, land cover, protected areas and selected socioeconomic and demographic data; • Agro-climatic resources, including a variety of climatic indicators; 	http://gaez.fao.org/Main.html	

	<ul style="list-style-type: none"> • Suitability and potential yields for up to 280 crops/land utilization types under alternative input and management levels for historical, current and future climate conditions; • Downscaled actual yields and production of main crop commodities, and • Yield and production gaps, in terms of ratios and differences between actual yield and production and potentials for main crops. 		
FAO Ecological Zones	FRA 2000 reported on various ecological aspects of forests. Forest resources information was reported by ecological zone, which contributed to understanding the implications of forest change on (ecosystem) biological diversity and carbon-cycling processes. The 2000 global ecological zone map was developed, building upon the FRA 1990 experience for the tropics and extending the coverage to include the temperate and boreal forests. A total of 19 global ecological zones were defined and mapped.	http://www.fao.org/geonetwork/srv/en/metadata.show?id=1255	
Africover	Roads, waterbodies and rivers	www.africover.org	
Landsat imagery	Multidate sample imagery and composites from USGS Global Land Survey (1990-2000-2005)	http://glovis.usgs.gov/	
MODIS Vegetation Continuous Fields	The Vegetation Continuous Fields collection contains proportional estimates for vegetative cover types: woody vegetation, herbaceous vegetation, and bare ground.	http://www.landcover.org/data/vcf/	
MODIS Humid tropical deforestation	Forest cover loss hotspot map (2000-2005). Biome-wide forest change hotspot maps were created using annual MODIS imagery for 2000 to 2005. This data represents areas of intensive forest cover clearing.	http://globalmonitoring.sdstate.edu/projects/gfm/humidtropics/data.html	
Topography	SRTM DEM (Shuttle Radar Topography Mission – Digital Elevation Model)	http://www2.jpl.nasa.gov/srtm/cbanddata/products.html	
Topography	Hydrosheds: Digital Elevation Model	http://hydrosheds.cr.usgs.gov/index.php	
Water	Hydrosheds: flow direction, flow accumulation, river network, drainage basins	http://hydrosheds.cr.usgs.gov/dataavail.php	
Global Reservoir and Dam (GRanD) database	While the main focus was to include all reservoirs with a storage capacity of more than 0.1 km ³ , many smaller reservoirs were added if data were available. The current version 1.1 of GRanD contains 6,862 records of reservoirs and their associated dams.	http://www.gwsp.org/85.html (Digital Water Atlas at GWSP) or http://sedac.ciesin.columbia.edu/pfs/grand.html (SEDAC at CIESIN)	
Ground Water Resources	The programme compiles data on groundwater from national, regional and global sources. The generated products provide information on quantity, quality and vulnerability of the groundwater resources.	http://www.whymap.org	

