

What is a degraded forest?¹

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Abstract: This paper and its annexes review the various published definitions of 'forest degradation' and 'degraded forest.' It offers suggestions and a key for objective classification for 'forest' and 'degraded forest' based upon existing definitions and standards.

Introduction

In 2002, the IPCC invited me to attend the first Authors/Experts Meeting in Tampere, Finland on 10-12 July 2002 and participate in Task 2 -Definitions and Methodological Options to Inventory Emissions from Direct Human-induced Degradation of Forests and Devegetation of Other Vegetation Types. Because of prior commitments, I was unable to attend the meeting, but I did prepare a background paper entitled *Review of published definitions of degraded forestland, devegetation, and related terms and antonyms*² for the attendees to consider (See Lund 2002a). Unfortunately, the IPCC experts were unable to agree on a common definition of forest degradation or degraded forest.

In November 2008, Ms Victoria Heymell FOIM, FAO, Rome kindly invited me participate in what she hopes will be a joint effort to better define, assess and report on Forest Degradation. This effort is to form a special study as part of the Global Forest Resources Assessment 2010, on harmonising forest definitions and on streamlining forest-related reporting. Specifically, Ms Heymell asked me to search out any new definitions since my 2002 work, links to websites or any other information that may be of use. This paper is the result of my search.

The purpose of this paper is to show the scope of forest degradation and related definitions used throughout the world; list considerations for standardizing or harmonizing national definitions; identify the more common parameters and/or proxy indicators of forest degradation and degraded forests; and lastly, identify some existing methodologies for assessing these parameters.

Annex 1 lists the various definitions that I found, Annex 2 - an example of the difficulty in developing a standard definition, and Annex 3 - some additional reading material.

Why should nations be concerned about forest degradation and degraded forest?

According to a *Concept Note on Assessment and Monitoring of Forest Degradation* sent to me by Ms Heywell, forest degradation features prominently in recent forest related global goals and targets to which most nations agreed:

- The first of the four Global Objectives on Forests of the Non-Legally Binding Instrument on All Types of Forests agreed to by members of the United Nations Forum on Forests includes the objective to "increase efforts to prevent forest degradation" (UN 2007)
- Parties at UNFCCC COP 13 agreed to take action on the Reduction of Emissions from Deforestation and Forest Degradation (REDD) in developing countries (COP 2007).
- The 2010 Biodiversity Target of the Convention on Biological Diversity includes an indicator on ecosystem fragmentation and connectivity (Didier and Thomson 2008). In addition, the COP sought actions that would: Promote projects and activities that encourage the use and supply of

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alternative sources of energy to prevent forest degradation due to the use of firewood by local communities, restore forest biological diversity in degraded secondary forests and in forests established on former forestlands and other landscapes, including in plantations, and create and improve where appropriate international, regional and national databases and case-studies on the status of degraded forests, deforested, restored and afforested lands (UNEP/CBD 2002).

Each of these goals and targets entail the assessment and monitoring of forest degradation and the reporting of the national situation.

First things first.

Before we can reach a common definition for 'forest degradation/' and 'degraded forest/', we first must have common understanding on just what is considered a 'forest'. Once we agree on what is a 'forest' then we can go about addressing degradation.

A 'forest' is generally considered to be an area covered with trees. But in addition to a land cover, the word 'forest' may mean an administrative or gazetted unit, a land use, or a biome (Lund 2002). If we consider 'forest' to be a cover of trees, then we also need to know what is a tree. Sure, it may be a woody perennial with one main stem, but some national definitions also include palms, bamboo, shrubs, vines, creepers, stumps, canes, brushwood, bushes, climbers, coppice shoots, orchids, and roots. If you wish to be overwhelmed with the number of published definitions of 'forest' and 'tree' that I have found please visit Lund (2008b).

FAO (2006a) lists the following key considerations when choosing and defining relevant terms:

- ♦ They should be unambiguous and serve the purpose, i.e. assessment of carbon stock changes and greenhouse gas emissions resulting from an activity;
- ♦ Definitional parameters should be measurable during assessment;
- ♦ Definitions should permit synergies and cost effective assessment and reporting, e.g. by building on related assessment and reporting processes.

The two most objective definitions of 'forest' used for compiling global reports from national data come from the UN FAO and the UN FCCC IPCC as follows:

(UN-FAO-2004) Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use. Explanatory notes: 1. Forest is determined both by the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 meters *in situ*. Areas under reforestation that have not yet reached but are expected to reach a canopy cover of 10 percent and a tree height of 5 m are included, as are temporarily unstocked areas, resulting from human intervention or natural causes, which are expected to regenerate. 2. Includes areas with bamboo and palms provided that height and canopy cover criteria are met. 3. Includes forest roads, firebreaks and other small open areas; forest in national parks, nature reserves and other protected areas such as those of specific scientific, historical, cultural or spiritual interest. 4. Includes windbreaks, shelterbelts and corridors of trees with an area of more than 0.5 ha and width of more than 20 m. 5. Includes plantations primarily used for forestry or protection purposes, such as rubberwood plantations and cork oak stands. 6. Excludes tree stands in agricultural production systems, for example in fruit plantations and agroforestry systems. The term also excludes trees in urban parks and gardens (FAO 2006b).

(UN-FCCC 2001) From Marrakesh Accords - "Forest" is a minimum area of land of 0.05-1.0 hectares³ with tree crown cover (or equivalent stocking level) of more than 10-30 per cent with trees with the potential to reach a minimum height of 2-5 metres at maturity *in situ*. A forest may consist either of

³ Nations may use any threshold within the range that is provided by the UNFCCC definition for greenhouse gas monitoring as long as they use the same threshold for each reporting period.

closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground or open forest. Young natural stands and all plantations which have yet to reach a crown density of 10-30 per cent or tree height of 2-5 metres are included under forest, as are areas normally forming part of the forest area which are temporarily unstocked as a result of human intervention such as harvesting or natural causes but which are expected to revert to forest (Schoene et al. 2007). This category includes all land with woody vegetation consistent with thresholds used to define forest land in the national GHG inventory, sub-divided into managed and unmanaged, and also by ecosystem type as specified in the *IPCC Guidelines**. It also includes systems with vegetation that currently fall below, but are expected to exceed, the threshold of the forest land category (Milne et al 2003, Lund 2006).

Note both definitions include the possibility of lands currently without trees to be classed as forest. It is very subjective to guess what the situation will be in the future and I recommend that classification be based upon what is the current situation.

Table 1 compares the FAO and the IPCC thresholds for identifying 'forest' land. Perhaps the major difference between the FAO and FCCC definitions is that the FAO excludes certain tree covered areas from being considered as forest where as the FCCC definition does not.

Table 1: Comparison of UN-FAO and FCCC Forest Land Classification Thresholds					
Organization	Minimum				Exclusions
	Area (ha)	Strip Width (m)	Crown Cover (per cent) at Maturity	Tree Height (m) at Maturity	
UN-FAO	0.5	20	10	5	Fruit plantations, orchards, urban parks, gardens
UN-FCCC-IPCC-GPG	0.05-1.0	None	10-30	2-5	None

As seen from above some standard definitions of 'forest' have already been established for nations to use when they do international reporting on forest stocks or for greenhouse gas emissions. So we no longer have to be concerned about what is a 'forest' for those efforts.

So what is degradation?

To 'degrade' is to lower the quality of something. 'Degradation' is process involved in doing so. So in the simplest terms, 'forest degradation' is the process of lowering the quality of forest land and a 'degraded forest' is the result of such action. But, which qualities? How much does the quality have to be lowered? This generic definition is not very useful for having any continuity in national monitoring and reporting and as of yet, there is no globally agreed, operational definition of 'forest degradation' or 'degraded forests.'

As with 'forest' there are many definitions of 'forest degradation' and 'degraded forest' in use. Annex1 lists some the various definitions that I ran across in my searches. In addition the annex also includes some definitions of related terms such as forest decline, fragmentation⁴ and desertification. As the reader will note, the perceptions of what constitutes a 'degraded forest' varies greatly. Much of the variation depends on the main point of interest such as biodiversity conservation, carbon sequestration, wood production, soil conservation, or recreation (FAO 2009).

⁴ Forest fragmentation is nearly always determined by the elimination of canopy cover or the creation of a barrier that prevents species from travelling for one area to another. Fragmentation may be natural or human-induced.

When we think of forest degradation, we usually think of a reduction of vegetative cover – especially trees. However, 'forest degradation' is a very complex and ambiguous concept. Its definition, interpretation, and use depend on what the objectives for which the land is managed. For example, if the objective is the complete protection of the forest ecosystem and all its components and functions, then economic harvesting of forest products could be considered degrading, even if it is managed "sustainably" - i.e. so as to provide a continuous and steady flow of economic benefits from harvested products. However, if the management objective is to obtain a sustainable yield of wood products from the forest, then harvesting would not be considered degrading (Lilpper 2000).

One must also consider how much change is needed before an area should be classed as degraded. Table 2 describes various degrees of degradation.

Table 2: Assessment of the degree⁵ of forest degradation (Modified from FAO 2002 and Liniger et al. 2008).			
Considerations	Degrees of Forest Degradation		
	Light⁶	Moderate⁷	Strong⁸
Intensity of disturbance	Slight to moderate intensity within a range of common natural disturbances	Severe intensity, caused by the clearing of at least 90% of the original forest cover	Drastic and repeated intensity with complete removal of the forest stand, loss of topsoil, and change in microclimate
Common causes of disturbance	Excessive wood exploitation Over-harvesting of NWFP Destructive natural disturbances such as forest fires, storms Over-Grazing	Clear-cutting, burning and subsequent abandonment of area Catastrophic large-scale natural disturbances: fire, flooding, storms, landslides.	Repeated over-use, repeated fire, grazing, or ecological mismanagement on fragile soils Soil erosion

⁵ **Degree** is the intensity of the land degradation process, e.g. in the case of soil erosion: the amount of soil washed or blown away Liniger et al. 2008.

⁶ **Light**: there are some indications of degradation, but the process is still in an initial phase. It can be easily stopped and damage repaired with minor efforts.

⁷ **Moderate**: degradation is apparent, but its control and full rehabilitation of the land is still possible with considerable efforts.

⁸ **Strong**: evident signs of degradation. Changes in land properties are significant and very difficult to restore within reasonable time limits.

Table 2: Assessment of the degree of forest degradation (Modified from FAO 2002 and Liniger et al. 2008).			
Considerations	Degrees of Forest Degradation		
	Light	Moderate	Strong
Vegetation development process	<p>Relatively small changes in processes, growth and regeneration dynamics except where over-grazing prevents natural regeneration</p> <p>Relic trees are often damaged (crown, stem), or are potential "losers" unable to achieve dynamic regrowth or are phenotypically inferior</p> <p>Recovery mainly through autogenous and spontaneous cycle replacement regeneration, usually complemented by coppice and seed bank</p> <p>Species composition change with over-exploitation of timber</p> <p>Successional changes are limited to more intensively affected areas</p>	<p>A sequence of successional changes takes place after the perturbation. In this process several phases or stages with specific floristic, structural and dynamic characteristics can be distinguished.</p> <p>Plant species composition changes in dominance gradually from early to late successional species</p> <p>Start of a highly dynamic growth process, with high rates of carbon assimilation and biomass aggregation</p>	<p>There is only very sluggish successional development after the cessation of the main disturbance.</p> <p>The process generally leads directly from forest cover to grassland or bushland, or, in extreme cases, to barren soil surface.</p>
Characteristics	<p>Forest structure not significantly damaged</p> <p>In forests subject of over-grazing, poor understorey development and absence of young age classes of the canopy species</p> <p>Light-demanding species regenerating after the disturbance are usually similar to those in the original forest stand</p>	<p>Regrowing forest differs in species composition and in physiognomy from primary forest. Species are highly light demanding</p>	<p>Forest vegetation is lacking; single or small groups of pioneer trees and shrubs may or may not occur</p>

Forest degradation may arise from either human or natural causes. There is a link between the two: human action can also influence vulnerability of the forest to degradation from natural causes such as fire, pest, and diseases. Since forests are a renewable resource, some forms of degradation are reversible, although rehabilitation may take a considerable time. However, degradation is sometimes irreversible, resulting in an irretrievable loss of some forest ecosystem functions. In contrast to deforestation, which is defined as permanent conversion to other uses, degradation implies the existence of some forest cover but a reduced capacity of the ecosystem to function (Lilpper 2000).

As you will note in Annex 1 'Forest degradation' definitions are either very general, focus on reduction in biological diversity, or reduction in biomass. Most definitions indicate that degradation may be natural or human-induced. Some, however, some are limited to actions that have been only human-induced.

To summarize, there are generally three commonly used parameters and/or proxy indicators when identifying degraded forests or forest degradation.

- ♦ Reduction in biomass for volume and carbon often reflected by a decrease in canopy cover and/or trees per unit area.
- ♦ Reduction in biological diversity – numbers of a specific species and numbers of species
- ♦ Reduction in soil as indicated by soil cover, depth or fertility

These reductions may be brought about by people's activities or as a result of natural phenomena (fires, floods, earthquakes, pest invasions, etc.). If limited to human-induced changes, must they be direct activities or may they be indirect such as fire prevention in an area that normally has naturally occurring fires causing a change of understory and overstory over time?

So what definition(s) are nations to use when reporting on their progress towards the global forest goals and targets? The most objective definition that I found addresses the loss of carbon stocks is as follow:

Forest degradation - A direct human-induced long-term loss (persisting for X years or more) of at least Y % of forest carbon stocks (and forest values) since time T and not qualifying as deforestation or an elected activity under Article 3.4 of the Kyoto Protocol (Schoene et al. 2007) and (Mollicone and Souza 2007).

Putting things together

Table 3 lists the characteristics of both 'forest' and 'degradation' definitions.

Table 3: Characteristics of forestland and forest degradation (Modified from Schoene et al. 2007).				
Indicators	Parameters	FAO 2003	IPCC 2003	Your Need ⁹
Forestland	Forestland classification			
	♦ Min. area (ha)	0.5	0.05-1	
	♦ Min. Strip width (m)	20		
	♦ Min. crown closure (%)	10	10-30	
	♦ Min. tree height (m)	5	2-5	
	♦ Exclusions	Yes		
Degraded Forest	Forest type			
	Change within the forest			
	♦ Structure			
	♦ Crown cover			
	♦ Species composition			
	♦ Stocking			
	Amount of reduced capacity to provide:			
	♦ Productivity			
	♦ Goods			
	♦ Services			
	♦ Carbon stocks		>Y%	
	♦ Other functions			
	Time scale	Long	Long	
	Specified duration		X-Years	
	Cause			
	♦ Human-induced			
	♦ Natural			

⁹ Enter a threshold value or a check for each parameter that is applicable to your situation.

	Reference state			
	♦ Natural forest			
	♦ Site			
	♦ Carbon stock at initial date			
	Management exclusion			
	♦ Deforestation ¹⁰			
	♦ Forest management under Art.3.4			

By combining the thresholds of the forest definition and those for degradation, we can construct a key for determining if land is degraded or not as follows.

Example Classification Key for Identifying Degraded Forest based upon FAO and FCCC Definitions of Forest.

1. Is the land area between 0.05 and 1.0 ha (>0.5 ha for FAO)? No – Classify with surrounding area. Yes- For FAO definition go to 2; If using the FCCC definition go to 3.
2. If the area is a strip, is it ≥ 20 m? No – Classify with surrounding area; Yes – go to 3.
3. Does the land have tree crown cover between 10-30 per cent (>10 per cent for FAO) or **will have such tree cover in the future?** No - Area is considered non-forest.; Yes – Go to 4.
4. Do or **will the trees** reach 2-5 m in height *in situ* at maturity (> 5 m for FAO)? No - Area is considered non-forest.; Yes –For FAO definition, go to 5; for FCCC definition, go to 6.
5. Does the cover type or land use (Orchards, urban parks, gardens etc) exclude the land from being classed as forest? No – Go to 6; Yes- Area is considered non-forest.
6. Has the tree cover been reduced since time **T**? No- Not considered degraded forest; Yes go to 7,
7. Does the amount of tree cover removed exceed **P** per cent? No- Not considered degraded forest; Yes – go to 8.
8. Has the reduction persisted for **X** years or more? No- Not considered degraded forest; Yes – go to 9.
9. Is the cause of the reduced tree cover **human-induced**? No- Not considered degraded forest; Yes – go to 10.
10. Is the cause a result of direct human-inducement? No- Not considered degraded forest; Yes – Considered Degraded forest.

In short, a ‘**degraded forest**’ is – An area still qualifying as forest (meets minimum area, percent tree cover, strip width thresholds and/or use) that has suffered direct **human-induced** long-term loss (persisting for **X** years or more) of at least **P** % of forest carbon stocks (and forest values) since time **T** and not qualifying as deforestation or an elected activity under Article 3.4 of the Kyoto Protocol.

Those thresholds for items highlighted in grey have yet to be determined.

Detection

Forest degradation implies reduction in biomass, decrease in species diversity, or decline in quality in terms of nutritional value for livestock and wildlife (Eswaran et al, 2001). Much of the reduction comes from human activities such as deforestation, selective logging and overgrazing (Table 4).

Table 4: Pressure and state indicators (LADA 2007)			
Vegetation resources	Pressure indicator	Degradation issue	State indicator
Deforestation	Land cover/land use	Loss of habitat	Vegetation activity
Selective logging	change	Erosion by water	Soil loss

¹⁰ If a parcel of land has been deforested, it is no longer considered ‘forest.’ Therefore it cannot be called ‘degraded forest’ even though it may have gotten that way through forest degradation.

Table 4: Pressure and state indicators (LADA 2007)			
Vegetation resources	Pressure indicator	Degradation issue	State indicator
			Soil fertility
Rangeland/overgrazing	Stocking rate Land cover/land use change	Soil compaction Decline of forage quality Erosion by water Erosion by wind	Soil health Vegetation activity Soil loss Soil fertility

To detect degradation one usually needs observations of the same area at two points in time or more. However, degradation may also be inferred by comparing the area in question with the surrounding forest. If the cover is lower than the surroundings, then one may assume that some type of change has taken place. Table 5 lists some of the sources to detect and verify degradation.

Table 5: Land Degradation Focal Area Strategic Objectives (modified from GEF 2007).		
Results of Degradation	Impact Indicators¹¹	Sources of Verification
Overall increase in trend and/or severity of land degradation	Percent decrease in Net Primary Productivity (NPP) ¹² and Rain-use Efficiency (RUE)	GLADA ¹³ and LUCC ¹⁴ mapping; CRIC reports; National GHG inventories
Unprotected ecosystem functions and processes, including carbon stocks in the soil, plants and biota, and fresh water	Percent decrease in carbon stocks (soil and plant biomass) and/or Percent availability of fresh water	Carbon facilities, remote sensing (NDVI)
A increase in the vulnerability of local populations to the impacts of climate change	Percent increase in mortality rates consequent upon crop failures and livestock deaths	National surveys and statistics
Declining livelihoods of rural (usually resource-poor) land users	Percent increase in number of rural households below the poverty line	National economic statistics; development reports
Undiversified funding sources for SLM	Percent decrease in diversity of funding sources (e.g. private sector, CDM)	National economic statistics; development reports

An overview of the various sources available for assessing forest degradation and their advantages and disadvantages is given in Table 6.

¹¹ The listed indicators will be further developed during the implementation of the MSP "Ensuring Impacts from SLM - Development of a Global Indicator System".

¹² Net primary productivity (NPP) is chosen as a proxy for ecosystem function. It directly reflects productivity improvements from SLM investments and its baseline is well-established by 30 years of compatible measurements by satellite remote sensing.

¹³ Global Land Degradation Assessment for Drylands; part of the GEF-funded, FAO-UNEP LADA project - <http://www.fao.org/nr/lada/>

¹⁴ Land Use and Land Cover Change project - <http://www.geo.ucl.ac.be/LUCC/lucc.html>

Table 6: Tools for degradation assessments (modified from Nachtergaele 2002)		
Tools	Advantages	Disadvantages
Expert Opinion	Rapid, Low Cost	Subjective, Unreplicable
Accounting	Rapid, Low Cost	Limited in to areas where a human-induced activity has taken place and for which there are records.
Remote Sensing	Mod. Rapid/Mod. Low cost	Focused on land cover only
Field Monitoring	Objective, direct	Slow, High cost
Productivity Measurements	Direct observation of effect	Variation due to other factors
Participatory Surveys	Grass roots , Driving factors	Subjective, mod high cost

Summary

This paper and its Annexes review the various definitions of ‘forest degradation’ and ‘degraded forest.’ It gives suggestions for objective definitions of ‘forest’ and ‘degraded forest’ and presents a key for classifying lands based upon these definitions.

‘Forest “degradation” is an unfortunate term for the purpose of addressing emissions from “forests remaining forests” (IPCC, 2003, 2007). The *Second Expert Meeting on Harmonizing Forest-related Definitions* (FAO, 2003) recommended using another term as “stock reduction” in the context of carbon monitoring in forests remaining forests (Schoene 2007). Nevertheless, we often are stuck with the hand we are dealt and the terms people use when developing agreements and conventions.

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- Schoene, Dieter et al. 2007. **Definitional issues related to reducing emissions from deforestation in developing countries.** Forests and Climate Change Working Paper 5. Rome, FAO. 29 p. <ftp://ftp.fao.org/docrep/fao/009/j9345e/j9345e00.pdf> and <http://www.fao.org/docrep/009/j9345e/j9345e08.htm>
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Annex 1 – Some published definitions¹⁵ of decline, degradation, degraded, desertification, forest fragmentation as they relate to the forest environment.

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
1999	IISD	Decline (Forest) - A blanket term encompassing deforestation (conversion of forests to other uses) and forest degradation (deterioration in health and quality). http://www.iisd.org/pdf/wcfsdsummary.pdf	General	N
n.d.	USA NAL	Decline (Forest) – A complex disorder involving abiotic and biotic stresses on a forest stand that results in a slow, progressive decrease in growth with loss of health and vigor. Mortality is common. However, affected trees may recover once the stresses are removed. Natural factors (hurricanes, floods, fires, drought, pests, etc.) as well as human activity (deforestation and forest degradation) are involved. http://agclass.nal.usda.gov/mtwdk.exe?w=31927&k=glossary&s=5&t=2&n=1&i=60	Biodiversity	N
2008	EOLSS	Decline (Forest) - Decrease in the vitality of forests, in this context owing to anthropogenic causes; while in former times decline of forests had been caused by over-exploitation and management practices with critical nutrient withdrawals (fourteenth to nineteenth centuries), more recently decline has been attributed to changes of the chemical environment, i.e. strong soil acidification by atmospheric acid input ("acid rain"). http://greenplanet.eolss.net/EolssLogin/mss/C09/E4-27/E4-27-08/E4-27-08-04/E4-27-08-04-TXT.aspx#Glossary	General	Y
2008	Olander et al.	Degradation - A loss of biomass density without a change in the area of forest cover (i.e. decrease in crown cover that does not fall below the 10– 30% threshold). http://www.iop.org/EJ/article/1748-9326/3/2/025011/erl8_2_025011.pdf?request-id=dc893ad1-7028-4e4a-a91d-c44bc540a975	Biomass	N
2000	World Bank	Degradation - Biological, chemical, and physical processes that result in loss of the productive potential of natural resources in areas that remain classified as forests. Degradation may be permanent, although some forests may recover naturally or with human assistance. http://www.holz.uni-goettingen.de/ek/woodsat/pdf/worldbankforestry.pdf	General	N
2001	Tanzania	Degradation - Considered as progressive removal of trees from a forest or woodland without requisite	Biomass	N

¹⁵ Definitions highlighted in green have been added since 1 December 2008. **Fragmentation** definitions are from: Lund, H. Gyde. 2008. *Definitions of old growth, pristine, climax, ancient forests, degradation, desertification, forest fragmentation, and similar terms*. [Online publication], Gainesville, VA: Forest Information Services. Misc. pagination. <http://home.comcast.net/~gyde/pristine.htm>. All other definitions are from: Lund, H. Gyde. 2002. *Review of published definitions of degraded forestland, devegetation, and related terms and antonyms*. Gainesville, VA: Forest Information Services. 31 p. Available at http://home.comcast.net/~gyde/degradation_definitions.doc. For definitions of **deforestation**, please see: Lund, H. Gyde (coord.) 2008. *Definitions of Forest, Deforestation, Afforestation, and Reforestation*. [Online] Gainesville, VA: Forest Information Services. Available from the World Wide Web: <http://home.comcast.net/~gyde/DEFpaper.htm>. Misc. pagination.

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		regeneration. http://www.unep-wcmc.org/forest/restoration/docs/TanzaniaFLR.PDF		
2008	CAN Intl.	Degradation - Direct, human-induced reduction in the natural carbon carrying capacity and carbon stocks of natural ecosystems http://www.climnet.org/CAN_2008_sep_LCA_REDD.pdf	Biomass	Y
2007	LADA	Degradation - or 'desertification' refers to irreversible decline in the 'biological potential' of the land.	General	N
1984	USA-Congress-OTA	Degradation - The biological, physical, and chemical processes that result in the loss of the productive potential of natural resources—e.g., soil erosion and loss of valuable or potentially valuable genetic types. http://www.theblackvault.com/documents/ota/Ota_4/DATA/1984/8426.PDF	General	N
		Degradation (Biological) - A type of soil degradation consisting of the mineralization of humus and an increase in the activity of micro-organisms responsible for organic decay, resulting in an overall decrease in organic matter. http://www.unu.edu/env/plec/l-degrade/index-toc.html	Soil	N
1991		Degradation (Biological) - The diminution of biological productivity or diversity. (1991) Sargent & Lowcock	Biodiversity	N
		Degradation (Chemical) - A number of types of soil degradation that may involve one or more of the following processes: leaching of nutritive elements; acidification; toxicities, other than excess of salts. http://www.unu.edu/env/plec/l-degrade/index-toc.html	Soil	N
		Degradation (Ecosystem) - A persistent reduction in the capacity to provide ecosystem services. http://www.greenfacts.org/glossary/def/degradation-of-ecosystems.htm	General	N
1996		Degradation (Ecosystem) - Any process or activity that removes or lessens the viability of ecosystem functions and processes, and hence biodiversity. Dunster & Dunster	Biodiversity	N
		Degradation (Ecosystem) - Processes or activities that weaken an ecosystem, adversely affecting biological diversity. http://www.nature.nps.gov/nrbib/HTML/%20files/32.htm#3152	Biodiversity	N
		Degradation (Environmental) - Exhaustion or destruction of a potentially renewable resource such as air, water, forest, or wildlife by consuming it at a rate faster than it is naturally renewed. If such use continues, the resource can become nonrenewable or nonexistent on a human time scale. Also see sustainable yield. http://www.geog.ouc.bc.ca/conted/onlinecourses/envirogloss/e.html	General	N
2003	IPPC	Degradation (Forest) - A direct human-induced activity that leads to a long-term reduction in forest carbon stocks. http://www.fao.org/docrep/009/j9345e/j9345e08.htm	Biomass	Y
2003 2007	IPPC CIFOR	Degradation (Forest) - A direct human-induced long-term loss (persisting for X years or more) of at least Y % of forest carbon stocks (and forest values) since time T and not qualifying as deforestation or an elected activity under Article 3.4 of the Kyoto Protocol.	Biomass	Y

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		http://www.fao.org/docrep/009/j9345e/j9345e08.htm and http://www.cifor.cgiar.org/publications/pdf_files/cop/session%202/1-Moyo-2-1-3-Monitoring%20forest-MPI.pdf		
2003 2005	IPCC ITTO	Degradation (Forest) - A direct human-induced loss of forest values (particularly carbon), likely to be characterized by a reduction of tree cover. Routine management from which crown cover will recover within the normal cycle of forest management operations is not included. http://www.fao.org/docrep/009/j9345e/j9345e08.htm	Biomass	Y
2008		Degradation (Forest) - A direct, human-induced long-term loss of a percentage of forest carbon stocks which does not qualify as deforestation, because: degradation may be due to seasonal or other natural (or climate change-related) causes rather than human-induced; it is difficult to discriminate human-induced from natural changes; and changes in the understory beneath the canopy can go unnoticed. http://www.iisd.ca/vol12/enb12376e.html	Biomass	Y
2000	UN-FAO	Degradation (Forest) - A loss of a desired level of maintenance over time of biological diversity, biotic integrity and ecological processes. http://www.fao.org/DOCREP/X7273E/x7273e05.htm#P0_0	Biomass	N
2000 2001		Degradation (Forest) - A loss of forest structure, productivity and native species diversity. A degraded site might still contain trees (i.e. a degraded site is not necessarily deforested) but it has lost at least some of its former ecological integrity. http://assets.panda.org/downloads/lowermekongregionaloerview.pdf and http://www.fao.org/docrep/005/Y4171E/Y4171E17.htm	General	N
2008	WRI	Degradation (Forest) - A reduction in tree density and/or increased disturbance to the forest that results in the loss of forest products and forest-derived ecological services. http://pdf.wri.org/indoforest_glossary.pdf	Biomass	N
2002 2004	Indonesia	Degradation (Forest) - A reduction in tree density and/or increased disturbance to the forest that results in the loss of forest products and forest-derived ecological services. Common causes of forest degradation include selective felling, fuelwood collection, road building, and shifting cultivation. http://www.irgild.com/Resources/Publications/ANE/2004-02%20Indonesia%20Biodiversity%20and%20Tropical%20Forest.pdf and http://www.globalforestwatch.org/common/indonesia/sof.in.donesia.english.low.pdf	Biomass	Y
2000	UN-FAO	Degradation (Forest) - A reduction of canopy cover or stocking within the forest. Explanatory note: For the purpose of having a harmonized set of forest and forest change definitions, that also is measurable with conventional techniques, forest degradation is assumed to be indicated by the reduction of canopy cover and/or	Biomass	N

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		stocking of the forest through logging, fire, windfelling or other events, provided that the canopy cover stays above 10% (cf. definition of forest). In a more general sense, forest degradation is the long-term reduction of the overall supply of benefits from forest, which includes wood, biodiversity and other products or service. http://www.fao.org/docrep/009/j9345e/j9345e08.htm		
2001	UN-EP/CBD	Degradation (Forest) - A secondary forest that has lost, through human activities, the structure, function, species composition or productivity normally associated with a natural forest type expected on that site. Hence, a degraded forest delivers a reduced supply of goods and services from the given site and maintains only limited biological diversity. Biological diversity of degraded forests includes many non-tree components, which may dominate in the under-canopy vegetation. http://www.fao.org/docrep/009/j9345e/j9345e08.htm .	Biodiversity	Y
2004		Degradation (Forest) - Biological, chemical, and physical processes that result in loss of the productive potential of natural resources in areas that remain classified as forests. Degradation may be permanent, although some forests may recover naturally or with human assistance. https://www.uni-hohenheim.de/i490a/teaching/M4901-430/ws_03_04/reading_materials/New_Neef_Schwarzmeier_Studie.pdf . Neef_ & Schwarzmeier http://europa.eu.int/comm/dg08/forests/en/en4_6.htm and http://yahwood.com/glossary_uk.htm	General	N
2006		Degradation (Forest) - Biotic or abiotic processes that result in the loss of productive potential of natural resources in areas that remain classified as forests. Degraded forest may take a long time to recover thus requiring human intervention. http://www.alcoa.com/global/en/community/fellow_details/final_reports/Gitundu_Kairo_Final_Report_2nd_Installment.pdf	General	N
		Degradation (Forest) - Change of forest class (from closed to open forest) which negatively affects the stand or site and lowers production capacity. Degradation is not reflected in the estimates of deforestation. http://europa.eu.int/comm/dg08/forests/en/en4_6.htm	Biomass	N
1998	UN-FAO	Degradation (Forest) - Changes within the forest class (e.g. from closed to open forest) which negatively affect the stand or site and, in particular, lower the production capacity, are termed forest degradation FAO, 1998 http://www.cifor.cgiar.org/rehab/_ref/glossary/Deforestation.htm	Biomass	N
2008	UN-FAO	Degradation (Forest) - Changes within the forest class (for example, from closed to open forest) that negatively affect the stand or site and, in particular, lower production capacity. Common causes of forest degradation include selective felling, fuelwood collection, road building, and shifting cultivation. http://pdf.wri.org/indoforest_glossary.pdf	Biomass	N

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		Degradation (Forest) - Changes within the forest class which negatively affect the stand or site and, in particular, lower the production capacity. Thus degradation is not reflected in the estimates of deforestation. http://faov02.fao.org:70/0gopher_root%3a[fao.fra]def_uk.txt	Biomass	N
1997	UN-FAO	Degradation (Forest) - Changes within the forest class, for example, from closed to open forest, which negatively affect the stand or site and, in particular, lower the production capacity. These lands are considered apart from deforestation. FAO 1997	Biomass	N
2007	UN-EP	Degradation (Forest) - Changes within the forest that negatively affect the structure or function of the stand or site, and thereby lower the capacity to supply products and/or services http://www.unep.org/geo/geo4/report/Glossary.pdf	General	N
2001 2006	UN-FAO	Degradation (Forest) - Changes within the forest which negatively affect the structure or function of the stand or site, and thereby lower the capacity to supply products and/or services. Explanatory note: Takes different forms particularly in open forest formations deriving mainly from human activities such as overgrazing, overexploitation (for fuelwood or timber), repeated fires, or due to attacks by insects, diseases, plant parasites or other natural sources such as cyclones. In most cases, degradation does not show as a decrease in the area of woody vegetation but rather as a gradual reduction of biomass, changes in species composition and soil degradation. Unsustainable logging practices can contribute to degradation if the extraction of mature trees is not accompanied with their regeneration or if the use of heavy machinery causes soil compaction or loss of productive forest area. http://www.fao.org/docrep/009/j9345e/j9345e08.htm	Biomass	N
	WRI	Degradation (Forest) - Generally defined as a reduction in tree density and/or increased disturbance to the forest that result in the loss of forest products and forest-derived ecological services. http://www.wri.org/pdf/indoforest_glossary.pdf	Biomass	N
2002	ITTO	Degradation (Forest) - Long-term reduction of the overall potential supply of benefits from the forest, including wood, biodiversity and other products or services. http://www.fao.org/docrep/009/j9345e/j9345e08.htm	General	N
2004	UN-FAO	Degradation (Forest) - Occurs when the structure or function of a forest is negatively affected, reducing the ability of the forest to provide services or products (FAO, 2004). http://www.cbd.int/doc/meetings/tk/redd-llc-01/other/redd-llc-01-unu-en.pdf	General	N
2002	UN-FAO	Degradation (Forest) - Takes different forms, particularly in open forest formations, derives mainly from human activities such as over-grazing, over-exploitation (especially for fuelwood), repeated fires, or due to attacks by insects, diseases, plant parasites or other natural sources such as cyclones. In most cases, degradation	Biomass	N

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		does not show as a decrease in the area of woody vegetation but rather as a gradual reduction of biomass, changes in species composition and soil degradation. Unsustainable logging practices for roundwood and veneer in the absence of a correct management plan can contribute to degradation if the extraction of mature trees is not accompanied with their regeneration or if the use of heavy machinery causes soil compaction or loss of productive forest area (FAO, 1998b) FAO 2002. http://www.fao.org/docrep/005/y2328e/y2328e27.htm		
1996		Degradation (Forest) - Temporary or permanent reduction in the density, structure, species composition or productivity of vegetation cover. Grainger	Biomass	N
2005	UN-HCR	Degradation (Forest) – The change of forest class (from closed to open forest) which negatively affects the stand or site and lowers production capacity. http://postconflict.unep.ch/liberia/displacement/documents/UNHCR_IUCN_Forest_Management_Refugee_Returnee_Situations.pdf	Biomass	N
		Degradation (Forest) - The degradation of forest environments, through processes such as destructive logging, burning, or invasion of disturbed habitats by weedy or less useful exotic species. http://www.spcforests.org/Library/usestatus/usestatus.htm	General	N
		Degradation (Forest) - The degradation or impoverishment of forests, measured in terms of loss of biodiversity (which includes genetic, species and ecosystem diversity) and economic, cultural and ecological utility and stability, resulting from the selective removal of trees or other forest plant and animal species ... http://www.spcforests.org/Library/usestatus/usestatus.htm	Biodiversity	N
2007		Degradation (Forest) - The depletion of forest to tree crown cover at a level above 10 percent, however beyond this general statement, the IPCC has not provided a specific definition (Karousakis & Coffee-Morlot, 2007). http://www.forestsnow.org/content.php?theid=43 Karousakis & Coffee-Morlot	Biomass	N
2008		Degradation (Forest) - The deterioration of the health, quality and productive capacity of a forest. http://www.peopleandplanet.net/section.php?section=1&topic=8	General	N
1997 1999	Sask UN-DP UN-FAO	Degradation (Forest) - The ecologically deleterious depletion by human activity of standing woody biomass and organic matter in forests, often associated with over-utilization of the forest for fuel or timber. (1997) http://www.usask.ca/agriculture/caedac/dbases/glossary.htm , http://www.fao.org/docrep/005/y4171e/Y4171E21.htm , http://www.profor.info/pdf/InnovatForesFinanc.pdf , http://www.un.org.vn/undp/projects/profor/pdf/files/trexler.pdf and http://www.teleport.com/~taa/glossary.htm	Biomass	N
2000	UN-FAO	Degradation (Forest) - The long-term reduction of the	General	N

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
2003		overall potential supply of benefits from the forest, which includes carbon, wood, biodiversity and other goods and services. http://www.fao.org/docrep/009/j9345e/j9345e08.htm		
2003	IPPC	Degradation (Forest) - The overuse or poor management of forests that leads to long-term reduced biomass density (carbon stocks). http://www.fao.org/docrep/009/j9345e/j9345e08.htm	Biomass	Y
		Degradation (Forest) - The reduction in grade, quality, yield, etc. http://www.forestry.utoronto.ca/ac_staff/emeritus/My%20Webs/english.htm	General	N
2008	UN-FAO	Degradation (Forest) - The reduction of the capacity of a forest to provide goods and services. FAO (2008) Concept Note - Assessment and Monitoring of Forest Degradation.	General	N
	Bolivia	Degradation (Forest) (Bolivia) - Degradación: Proceso que consiste la transformación de un sistema, orden, estructura o sustancia compleja, a un nivel inferior. así tenemos la degradación biológica, de los bosques. Source: Luis Castello faopaf@caoba.entelnet.bo Adjunto sírvase encontrar la versión no oficial y premilinar del Glosario Forestal elaborado por el Proyecto de Apoyo a la Coordinación e Implementación del Plan de Acción Forestal para Bolivia	Biodiversity	N
	Canada	Degradation (Forest) (Canada - BC) - The diminution of biological productivity or diversity. http://www.for.gov.bc.ca/pab/publictns/glossary/glossary.htm	Biodiversity	N
1983	Italy	Degradation (Forest) (Italy) -Degradation concerns only human induced damages or site alterations. The origin of these damages become by ongoing or made in the past human actions and refers to irrational forest harvesting, fire, grazing, etc., which usually reduce permanently the site index and may negatively affect the stand. Castellani, C., et al 1983.	Biomass	Y
	Morocco Yemen	Degradation (Forest) (Morocco and Yemen) - An aggression on the forest as ecosystem, leading to a negative change in all its biotope (fauna, flora, soil, micro/meso climate). The productivity of the whole ecosystem is lower. Degradation could lead to erosion, drought, desertification and other calamities. Mohammed Ellatifi, m.ellatifi@ellatifi.8m.com	Biodiversity	N
		Degradation (Genetic) - Deleterious change in a native taxon's gene pool due to addition of non-local genes. The gene source can be plants of a) the same genus or species, but a non-local Californian taxon, ecotype or cultivar; b) the same genus, but a foreign taxon. http://www.cnps.org/archives/landscaping.htm	Biodiversity	N
	CBD	Degradation (Habitat) - The diminishment of habitat quality, which results in a reduced ability to support flora and fauna species. http://www.cbd.int/cepa/toolkit/html/resources/FD/FDF8CE88-237B-46FF-BB5F-42304D735C23/Biodiversity	Biodiversity	N

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		%20Glossary.pdf		
2004	UN-FAO	Degradation (Land) - A complex set of processes of impoverishment of terrestrial ecosystems under the impact of human activities. Land degradation can be understood as the gradual or permanent loss of productivity of the land resulting from human activities, mainly from the mismatch between land quality and the intensity of activities as part of the actual land use. Ponce-Hernandez and Koohafkan (FAO 2004) http://www.fao.org/nr/lada/index.php?option=com_docman&task=doc_download&gid=15&Itemid=157	General	Y
n.d.	LADA	Degradation (Land) - A long term loss of ecosystem functions and land productivity. http://www.fao.org/nr/lada/index.php?option=com_docman&task=doc_download&gid=21&Itemid=157	General	N
1998	UN-CCD	Degradation (Land) - A natural process or a human activity that causes the land no longer being able to sustain properly its economic functions or the original ecological functions (UNCCD quoted in FAO, 1998: Terminology for integrated resources planning and management. www.fao.org/ag/agl/aglhomep.stm) and http://www.fao.org/nr/lada/index.php?option=com_docman&task=doc_download&gid=15&Itemid=157	General	N
2008	EOLSS	Degradation (Land) - Deterioration of natural conditions. http://greenplanet.eolss.net/EolssLogin/searchdt.asp?cmd=getdoc&maxSize=200000&DocId=87&Index=D%3aIProgram%20Files%20dtSearch%20Developer%20Data%20C19&HitCount=2&hits=4cc+4cd+&hc=4&req=forest%20degradation	General	N
n.d.	UN-FAO	Degradation (Land) - The capacity of the land to perform ecosystem functions and services that matters most. http://www.fao.org/nr/lada/index.php?option=com_docman&task=doc_download&gid=15&Itemid=157	General	N
		Degradation (Land) - The decline in condition or quality of the land as a consequence of human activities. http://www.emrc.org.au/res/glossary.html#terms	General	Y
1995?	Australia	Degradation (Land) - The decline in condition or quality of the land as a consequence of misuse or overuse, involving changes to soil, flora, fauna, water quality and quantity, visual quality and production levels by humans. http://www.epa.nsw.gov.au/soe/95/28.htm	General	Y
		Degradation (Land) - The deterioration or total loss of the productive capacity of land for present and future use. Such loss occurs mainly because of various forms of soil erosion (by wind and water) and of chemical and physical deterioration. http://www.adb.org/projects/PRC_GEF_Partnership/LD_definition.pdf	General	N
1996		Degradation (Land) - The erosional removal of materials	Soil	N

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		from one place to another, which lowers the elevation of streambeds and floodplains. Dunster & Dunster		
2008		Degradation (Land) - The long-term loss of ecosystem function and productivity caused by disturbances from which the land cannot recover unaided (Bai and others 2008).	General	N
2006	UN-FAO LADA	Degradation (Land) - The reduction in the capacity of the land to perform ecosystem functions and services that support society and development. (LADA team, FAO, 2006: Reflections on indicators for land degradation assessment. Draft) http://www.fao.org/nr/lada/index.php?option=com_docman&task=doc_download&gid=15&Itemid=157	General	N
2003	UN-CCD	Degradation (Land) - The reduction or loss of the biological or economic productivity and complexity of rain fed cropland, irrigated cropland or range, pasture, forest and woodlands resulting from land users or from a process or a combination of processes, including processes arising from human activities and habitation patterns such as soil erosion, deterioration of the physical, chemical and biological economic properties of soil and long term loss of natural vegetation. http://www.unccd.int/regional/asia/meetings/national/srilanka7_03/workproceedings.pdf and http://yahwood.com/glossary_uk.htm	Soil	Y
		Degradation (Land) - The temporary or permanent lowering of the productive capacity of land. http://www.unu.edu/env/plec/l-degrade/index-toc.html	General	N
		Degradation (Natural Habitat) - Modifications which substantially reduce a habitat's ability to maintain viable populations of its native species. http://www.ifc.org/enviro/enviro/Review_Procedure_Main/Review_Procedure/Glossary_of_Terms/glossary.htm	Biodiversity	N
		Degradation (Natural Resources) - Any decline in the quality of natural resources commonly caused by human activities. http://www.emrc.org.au/res/glossary.html#terms and http://www.epa.nsw.gov.au/soe/95/28.htm	General	Y
		Degradation (Natural Resources) - Any decline in the quality of natural resources or the viability of ecosystems, caused directly or indirectly by human activities. http://www.contacttrust.org.za/BiodiversityNetwork/webpage/docs/glossary.htm	General	Y
	USA	Degradation (Range) - The degeneration of a site caused by biotic or abiotic factors, which results in a lowered successional status to the point that ecological potential is changed. www.plant-materials.nrcs.usda.gov/pubs/idpmctn280101.pdf and http://www.roseworthy.adelaide.edu.au/~icooper/glossary/r.htm	Biodiversity	N
		Degradation (Semi-natural Forest) - A subset of semi-natural forests with some of the principle characteristics and key components of native ecosystems; a return to a semi-natural forest is unlikely to occur in a reasonable	General	N

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		amount of time (i.e., decades) without human intervention. http://www.fscus.org/html/about_fsc/who_we_are/glossary_of_terms.html#d		
		Degradation (Soil) - A decrease in soil quality as measured by changes in soil properties and processes, and the consequent decline in productivity in terms of immediate and future production. http://www.unu.edu/env/plec/l-degrade/index-toc.html	Soil	N
		Degradation (Soil) - A set of types of soil degradation involving one or more of the following processes: loss of soil physical structure; sealing and crusting of soil surface; reduction in permeability; compaction of depth; increase in macroporosity; limitations to rooting. http://www.unu.edu/env/plec/l-degrade/index-toc.html	Soil	N
		Degradation (Soil) - Any significant reduction in the fertility of a soil. http://fwie.fw.vt.edu/rhgiles/appendices/glossd.htm	Soil	N
		Degradation (Soil) - General lowering of land surfaces by erosion. http://fwie.fw.vt.edu/rhgiles/appendices/glossd.htm	Soil	N
		Degradation (Soil) - Loss of friability or fertility of soil resulting from leaching. http://glossary.gardenweb.com/glossary/nph-ind.cgi?scrug=16677&k=degradation&b=and&r=whole&s=terms	Soil	N
2008		Degradation (Soil) - Loss of one or more functions. http://www.soil.ch/doku/verein_it08_carne.pdf	General	N
	Canada	Degradation (Soil) - The decline in a soil's fertility as a result of loss of organic matter, erosion by wind or water, compaction, salinization, contamination, or acidification. http://museum.gov.ns.ca/mnh/nature/nhns2/glossary.htm	Soil	N
	Canada	Degradation (Soil) - The changing of a soil to a more highly leached and weathered state, usually accompanied by morphological changes such as the development of an eluviated, light-colored A (Ae) horizon. http://sis.agr.gc.ca/cansis/glossary/degradation.html	Soil	N
		Degradation (Species) - The state or condition of a species or group which exhibits degraded forms; degeneration. http://www.mso.anu.edu.au/~ralph/OPTED/v003/wb1913_d.html	Biodiversity	N
	USA Texas	Degradation (Streambed) - A progressive lowering of the channel bed due to scour. Degradation is an indicator that the stream's discharge and/or sediment load is changing. The opposite of aggradation. http://www.tpwd.state.tx.us/texaswater/rivers/glossaryleft.htm	Soil	N
		Degradation (Streambed) - The general lowering of the streambed by erosive processes, such as scouring by flowing water. http://www.orst.edu/Dept/owrri/directory/glossary.htm#~D~	Soil	N
2007	LADA	Degradation (Vegetation) - Implies reduction in biomass, decrease in species diversity, or decline in quality in terms of nutritional value for livestock and wildlife	General	N

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		Degradation (Water) - Deterioration in water quality due to contamination or pollution; makes water unsuitable for other desirable purposes. http://www.mhhe.com/biosci/pae/glossary/glossaryd.mhtml	General	N
	Australia	Degradation (Wood) - Reduction in wood quality resulting from insect damage, fungal decay or fungal staining. http://216.239.51.100/search?q=cache:GISJPPoeSDUC:www.nre.vic.gov.au/web/root/domino/inf.series/infsheet.nsf/ec560317440956e24a2568e3000bb3d9/5d033a7c16fbff3c4a25679c002137f4/%24FILE/AG0798.pdf+degrade+forest+glossary&hl=en	General	N
2005	AMEC	Degraded Forest – A forest that has been essentially modified by human activity and has reduced the habitat's ability to maintain viable populations of native species. These forests may also be under current threat from local people involved in illegal activities which will continue to degrade the forest structure and its associated hydrology and thereby its habitat values for the conservation of fauna and flora and sustainable livelihood of local people. Degraded forests have been essentially modified through previous logging, indicated by evidence of railway lines and large openings, fires, or extensive networks of canals in peat areas. (AMEC definition derived from World Bank) http://eyesontheforest.or.id/index.php?option=com_docman&task=doc_download&gid=5 and http://www.rainforestalliance.org/programs/forestry/smartwood/documents/SmartWoodHCVFAssessmentReport_PulauMuda_Final1October04.pdf	Biodiversity	Y
2008	Uganda	Degraded Forest - A forest whose capacity to provide goods and services has been reduced. Capacity includes maintenance of ecosystem structure and functions (Adapted from: European Forestry Institute, Internal Report No. 6, 2002.) http://www.envalert.org/docs/inventoryofcriticalissuesinforesstry.pdf	General	N
2002	FAO	Degraded Forest - A generic term comprising all those forests or forest lands that have been altered beyond the normal effects of natural processes through unsustainable use through human activities or natural disasters such as fire, landslides, etc. Three conditions may exist – primary forest, secondary forests and forest land. http://www.fao.org/docrep/005/Y4171E/Y4171E17.htm	Biomass	N
2001	UN-EP/CBD/SBSTTA	Degraded Forest - A secondary forest that has lost, through human activities, the structure, function, species composition or productivity normally associated with a natural forest type expected on that site. Hence, a degraded forest delivers a reduced supply of goods and services from the given site and maintains only limited biological diversity. Biological diversity of degraded forests includes many non-tree components, which may dominate	General	Y

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		in the under canopy vegetation. (UNEP/CBD/SBSTTA, 2001) http://unfcccball.org/unfccc/component?option=com_glossary/Itemid,99/func.view/catid,31/term.Degraded+Forest/ and http://www.biodiv.org/programmes/areas/forest/definitions.asp		
2002	ITTO	Degraded Forest - Degraded and secondary forests: forests and forest lands that have been altered beyond the normal effects of natural processes through unsustainable use or through natural disasters such as storms, fire, landslides and floods. http://www.ito.or.jp/live/Live_Server/154/ps13e.pdf	General	N
	Slovenia	Degraded Forest - Forest in which the growth rate, or the fertility of forest land, is reduced, or other possibilities for it to perform its function as a forest are reduced by negative outside influences. Slovenian LAW ON FORESTS - Milan SINKO milan.sinko@UNI-LJ.SI via "Maksym Polyakov" mpoliak@pcomp.usau.kiev.ua	Biomass	N
2005		Degraded Forest - Forest no longer in its natural state, its structure being modified by human activity or natural conditions, either directly, e.g., high-impact logging, or indirectly, e.g., flooding of forests caused by downstream obstruction to rivers by infrastructure development. The majority of its floristic composition is retained, but opening of the canopy has resulted in colonization, or regeneration, of light-loving species. Depending on proximity to sources of colonization, scrub species (mammals and birds) may or may not occur. http://eyesontheforest.or.id/index.php?option=com_docman&task=doc_download&gid=5 and http://www.rainforestalliance.org/programs/forestry/smartwood/documents/SmartWoodHCVFAssessmentReport_PulauMuda_Final1October04.pdf	Biodiversity	N
2004		Degraded Forest - Forest suffering from the loss of native species and processes due to human activities such that only certain components of the original biodiversity persist, often including significantly altered communities. (60 Ricketts, Taylor, et al. Terrestrial Ecoregions of North America. World Wildlife Fund – United States and Canada. Washington, D.C.: Island Press.) http://www.forestethics.org/downloads/EF_Components_56_without_maps.pdf	Biodiversity	N
2002 2007	ITTO Fiji	Degraded Forest - Forest that delivers a reduced supply of goods and services from a given site and maintains only limited biological diversity. It has lost the structure, function, species composition and /or productivity normally associated with the natural forest type expected at that site (ITTO, 2002) http://unfcccball.org/unfccc/component?option=com_glossary/Itemid,99/func.view/catid,31/term.Degraded+Forest/	Biodiversity	N
1994		Degraded Forest - Lands are described as degraded	Biodiversity	Y

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		when their edaphic conditions and/or biotic richness have been reduced by human activity to such a degree that their ability to satisfy particular uses has declined. http://www.fao.org/docrep/005/Y4171E/Y4171E17.htm Brown & Lugo		
2008		Degraded Forest - Severe impacted areas due to excessive harvesting of wood, poor management, repeated fire and/or overgrazing, with a small degree of natural regrowth. Santos et al	Biomass	Y
2002	ITTO	Degraded Forest - The forest that delivers a reduced supply of goods and services from a given site and maintains only limited biological diversity. It has lost the structure, function, species composition and /or productivity normally associated with the natural forest type expected at that site. (ITTO, 2002) http://unfcccball.org/unfccc/component/option.com_glossary/Itemid,100/func.display/letter.D/catid,31/page,1/	Biodiversity	N
2008		Degraded Forest - The state of forest in terms of canopy cover, health, anthropogenic disturbance and so on. Joshi et al. 2006.	General	Y
	Africa	Degraded Forest (Africa only) - Degraded forest are areas in Africa where human activity is visible. Due to the land use patterns, including selective logging, differentiation between deforestation/revegetation/agriculture is not currently possible. Generally discernible from natural forest, the true extent may only be determined through ground verification. http://www.geog.umd.edu/tropical/per80v141README	Biomass	Y
2002	FAO ITTO	Degraded Forest (Land) - Former forest land severely damaged by excessive harvesting of wood and/or non-wood forest products, poor management, repeated fire, grazing or other disturbances and land uses that damage soil and vegetation to a degree which inhibits or severely delays forest re-growth after abandonment. http://www.fao.org/docrep/005/Y4171E/Y4171E17.htm , http://unfcccball.org/unfccc/component/option.com_glossary/Itemid,99/func.view/catid,31/term.Degraded+Forest+Land/ and http://unfcccball.org/unfccc/component/option.com_glossary/Itemid,100/func.display/letter.D/catid,31/page,1/	Biomass	N
2001	IPCC	Degraded Forest (Land) - Formerly forested lands severely impacted by intensive and/or repeated disturbance (such as mining, repeated fires or overgrazing) with consequently inhibited or delayed forest regrowth. These include barrens areas, Imperata grasslands, brushlands, and scrublands. (Chokkalingam, U. and Wil de Jong, 2001) http://unfcccball.org/unfccc/component/option.com_glossary/Itemid,99/func.display/letter.AII/page,6/catid,31	Biomass	N
2002	ITTO	Degraded Forest (Primary) - Forests that have been altered beyond the normal effects of natural processes are categorized as either degraded primary forest, secondary	General	N

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		forest, or degraded forest land. http://www.itto.or.jp/live/Live_Server/154/ps13e.pdf		
2002	ITTO	Degraded Forest (Primary) - Primary forest in which the initial cover has been adversely affected by the unsustainable harvesting of wood and/or non-wood forest products so that its structure, processes, functions and dynamics are altered beyond the short-term resilience of the ecosystem; that is, the capacity of these forests to fully recover from exploitation in the near to medium term has been compromised. http://www.itto.or.jp/live/Live_Server/154/ps13e.pdf	Biomass	Y
2002	FAO	Degraded Forest (Primary) - The initial forest structure, productivity and species diversity of the primary forest has been affected by excessive and wood extraction and/or by such an intensity of harvesting of non-wood forest products that its capacity to provide goods and services has been impaired. http://www.fao.org/docrep/005/Y4171E/Y4171E17.htm	Biomass	Y
2002	ITTO	Degraded Forest (Secondary) - Woody vegetation regrowing on land that was largely cleared of its original forest cover (i.e. carried less than 10% of the original forest cover). Secondary forests commonly develop naturally on land abandoned after shifting cultivation, settled agriculture, pasture, or failed tree plantations. http://www.itto.or.jp/live/Live_Server/154/ps13e.pdf	Biomass	Y
2002	FAO	Degraded Forest (Secondary) - Woody vegetation spontaneously regrowing on land that was largely cleared of its original forest vegetation. http://www.fao.org/docrep/005/Y4171E/Y4171E17.htm	Biomass	N
		Degraded Forest (Stand) - A forest stand that has suffered damage to natural composition, structures, and functions to such an extent that population levels and diversity of organisms have been changed in an unnatural manner, or where structures required for ecological processes and populations in later temporal phases have been removed and/or will not be regenerated due to human disturbance. http://www.web.net/~fscga/standard.htm#anchor88641	Biodiversity	Y
		Degraded Wetland – A wetland which has been altered by man through impairment of some physical property and in which the alteration has resulted in a reduction of biological complexity in terms of species diversity of wetland-associated species which previously existed in the wetland areas. http://www.wsu.edu/pmc_nrcs/glossary/ddd.htm#D	Biodiversity	Y
		Desertification - A fertile region that has been made barren by the activities of human societies. http://campus.murraystate.edu/academic/faculty/frank.elw ell/Prob3/glossary/gloss1.htm#DECARCERATION	Soil	Y
		Desertification - A process by which fragile, semiarid ecosystems lose productivity because of loss of plant cover, soil erosion, salinization, or waterlogging. Usually associated with human misuse.	General	Y

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		http://www.mhhe.com/biosci/pae/glossary/glossaryd.mhtml		
		Desertification - A process of land degradation initiated by human activity, particularly in the zones along the margins of deserts. http://www.ge-at.iastate.edu/courses/Geol_100/glossary.v2.html	General	Y
		Desertification - Conversion of rangeland, rain-fed cropland to desert-like land, with a drop in agricultural productivity of 10% or more. It is usually caused by a combination of overgrazing, soil erosion, prolonged drought, and climate change. http://ecology.org/biod/library/glos_index.html	Biomass	N
		Desertification - Dry land becoming desert, either through a change in climate or through the actions of humans. Intensive farming and clearing trees and other vegetation can make desertification worse. http://www.oxfam.org.uk/coolplanet/glossary.htm	Biomass	Y
		Desertification - Land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities. www.asia-tpn1.net/glossary.html and http://www.nyo.unep.org/action/ap1.htm	General	N
		Desertification - Land degradation in arid, semi-arid and dry sub-humid areas resulting mainly from adverse human impact (and climatic variations), and is therefore a sub-set of land degradation in countries that have additional climate zones. http://www.adb.org/projects/PRC_GEF_Partnership/LD_definition.pdf	General	Y
		Desertification - Land degradation in arid, semi-arid, and dry sub-humid areas resulting mainly from adverse human impact. http://www.gps.caltech.edu/~arid/desert/desert.html	General	Y
	CCD	Desertification - Land degradation in arid, semi-arid, and dry sub-humid areas (also referred to as drylands) resulting from various factors, including climatic variations and human activities.	General	N
2007	LADA	Desertification - or 'degradation' refers to irreversible decline in the 'biological potential' of the land.	General	N
	USA NASA	Desertification - The conversion of ecosystems into barren land. http://www.hq.nasa.gov/iwgsdi/ISS_SD1_Climate.html	Biomass	N
2008	EOLSS	Desertification - The creation of desert-like conditions in semi-arid areas, either by changes in the climatic pattern, or by human mismanagement. http://greenplanet.eolss.net/EolssLogin/searchdt.asp?cmd=getdoc&maxSize=200000&DocId=87&Index=D%3a\Program%20Files\dtSearch%20Developer\UserData\C19&HitCount=2&hits=4cc+4cd+&hc=4&req=forest%2Bdegradation	General	N
		Desertification - The diminution or destruction of the biological potential of land, and can lead ultimately to desert-like conditions.	Biodiversity	N

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		http://www.gps.caltech.edu/~arid/desert/desert.html		
1977	UN-Sec	Desertification - The diminution or destruction of the biological potential of the land, (which) can lead ultimately to desert-like conditions. UN Secretariat 1977	General	N
		Desertification - The extension of the desert into another ecological system such as into tropical grasslands. http://www.kgv.edu.hk/eden/glossary.php	General	N
	USA NASA	Desertification - The man-made or natural formation of desert from usable land. http://www.casde.unl.edu/vn/glossary/earth_d.htm#desertification and http://asd-www.larc.nasa.gov/asd_over/glossary/d.html and http://earthobservatory.nasa.gov:81/Library/glossary.php3?mode=alpha&seg=d	General	N
		Desertification - The spread or encroachment of a desert environment into arid or semiarid regions, caused by climatic changes, human influence, or both. http://www.britannica.com/eb/article?eu=30548&tocid=0	General	N
	Canada	Desertification - The transformation of once-productive arid and semi-arid areas into deserts through prolonged drought or continued mismanagement of land and water resources. http://www.nrcan.gc.ca/cfs-scf/science/prodserv/glossary_e.html#23 and http://www.fnfp.gc.ca/rep99/gloss-e.htm	General	N
	USA SC	Desertification - When an area begins to develop desert-like conditions due to lack of water, deforestation, overgrazing and over cropping. http://www.dnr.state.sc.us/climate/sercc/education/glossary/#d	General	N
		Desertification -The (usually) slow and progressive degradation of land towards a desert state. http://www.rbgekew.org.uk/aboutus/annualreport/sect5.pdf	General	H
		Desertification -The degradation of terrestrial ecosystems as a result of deforestation, overgrazing, poor soil, and irrigation management. http://www.orst.edu/Dept/owrri/directory/glossary.htm#~D~	General	Y
		Desertification -The process by which an area or region becomes more and through loss of soil and vegetative cover. The process is often accelerated by excessive continuous overstocking and drought. http://www.roseworthy.adelaide.edu.au/~icooper/glossary/d.htm	Soil	N
		Desertification -The process by which lands not formerly deserts become deserts, because of changes in temperature and rainfall. http://www.solutions-site.org/reference/glossary.htm	General	N
1995	Australia	Desertification -The process by which once productive land is turned into a desert by processes such as overstocking or removal of protective vegetation. http://www.epa.nsw.gov.au/soe/95/28.htm	Biomass	N
		Desertification -The process of a non-desert ecosystem taking on the characteristics of a desert (arid, seemingly barren) as a result of land mismanagement or climate	General	N

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		change. http://www.pbs.org/earthonedge/glossary.html		
		Desertification -The process of becoming arid land or desert (as from land mismanagement or climate change). http://sol.crest.org/renewables/SJ/glossary/D.html	General	N
		Desertification -The process of desert spread. http://www.learn.co.uk/default.asp?WCI=Unit&WCU=7568	General	N
		Desertification -The process of land degradation which leads to a drastic reduction of land productivity. Land is rendered unsuitable for any productive activity. It is prevalent in arid and semi-arid areas. Its causes are both natural (dry climate, low rainfall, water shortage) as well as anthropogenic (overgrazing, deforestation, fires, intensive cultivation). http://www.rri.wvu.edu/WebBook/Briassoulis/glossaryterms.htm	Biomass	N
		Desertification -The process through which a desert takes over a formerly non-desert area. When a region begins to undergo desertification, the new conditions typically include a significantly lowered water table, a reduced supply of surface water, increased salinity in natural waters and soils, progressive destruction of native vegetation, and an accelerated rate of erosion. http://www.iversonsoftware.com/geology/d/desertification.htm	General	N
		Desertification -The process through which once usable land is turned into desert because of overgrazing, harmful agricultural practices, or deforestation. http://cwabacon.pearsoned.com/bookbind/pubbooks/social_ab/chapter4/custom1/deluxe-content.html#desertification	Biomass	Y
		Desertification -The progressive destruction or degradation of existing vegetative cover to form desert. http://edugreen.teri.res.in/explore/glossary.htm#d and http://www.ciel.org/Publications/climatechangeglossary.pdf	Biomass	N
		Desertification -The progressive destruction or degradation of existing vegetative cover to form desert. This can occur due to overgrazing, deforestation, drought and the burning of extensive areas. Once formed, desert can only support a sparse range of vegetation. Climatic effects associated with this phenomenon include increased albedo, reduced atmospheric humidity and greater atmospheric dust loading, which can cause wind erosion and/or atmospheric pollution. http://www.ccasia.teri.res.in/gloss/glossary.htm	Biomass	N
		Desertification -The spread of deserts. http://mac01.eps.pitt.edu/harbbook/other/Glossary.html	General	N
2002a	Lund	Devegetated - Having removed the vegetation from an area.	Biomass	N
2003	IPCC	Devegetation - A direct human-induced long-term loss of at least Y % of vegetation since time T on vegetation types other than forest. Vegetation types consist of a minimum area of land of Z ha with foliar cover of W%. http://unfccc.int/files/methods_and_science/lulucf/applicati	Biomass	Y

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		on/pdf/060830_killmann.pdf		
		Devegetation - Destruction of vegetation (by fire, human impact). http://www.nature.nps.gov/nrbib/HTML%20files/33.htm#3259	Biomass	N
1998		Devegetation - The removal of vegetation and exposure of bare soil throughout at least one growing season. Lund 1998. Lund	Biomass	N
	USA NASA	Diminished Forest Land - Area and percent of forest land with diminished biological components indicative of changes in fundamental ecological processes (e.g. soil, nutrient cycling, seed dispersion, pollination) http://www.hq.nasa.gov/iwgsdi/SDI_Org_USDA.html	General	N
2006	FAO	Disturbance - An environmental fluctuation and destructive event that affects forest health, structure, and/or changes resource or physical environment at any spatial or temporal scale. Include biotic agents such as insects and diseases and abiotic agents such as fire, pollution and extreme weather conditions. http://unfccc.int/files/methods_and_science/lulucf/applications/pdf/060830_killmann.pdf	General	N
		Disturbance (Forest) - Any discrete force, for instance fire, wind, disease, insects, or logging that significantly alters forest composition, structure, and/or functioning. Natural disturbances include all historical disturbances that influenced forests prior to European contact, including those resulting from First Nations' use. http://www.silvafor.org/ecocert/sffstandardsforbc.pdf	General	N
	USA Ohio	Disturbed Forest - A forest that has changed or been degraded due to human impact. http://ohia.com/ohia/roadshows/sky/glossary.htm	General	Y
		Disturbed Forest - Any forest type that has in its interior significant areas of disturbance by people, including clearing, felling for wood extraction, anthropogenic fires, road construction, etc. http://www.globalchange.umich.edu/globalchange2/current/lectures/deforest/deforest.html	General	Y
		Fragmentation (Forest) - "Forest Fragmentation" is what happens when large contiguous patches of forests are fragmented, or split up, into several smaller patches. These remaining patches are separated by what is defined here as the "matrix" which is just anything other than mature forest and may include clear cuts, development or young plantation forests. http://www.environmentalsciences.homestead.com/aboutfragmentation.html		N
		Fragmentation (Forest) - A break up of a continuous landscape containing large patches into smaller, usually more numerous and less-connected patches. http://ndis.nrel.colostate.edu/davet/pubs%5Cfragtools.htm		N
		Fragmentation (Forest) - A detaching or separation of expansive tracts into spatially segmented corridors or fragments. http://www.studentcentral.co.uk/coursework/University_Es		N

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		says/Geography/		
	Canada MNR	Fragmentation (Forest) - A forest condition where human disturbance is distributed in such a fashion as to separate habitats into unnaturally small or extremely dispersed pieces. http://www.mnr.gov.on.ca/MNR/temagami/SECTION5.htm		Y
		Fragmentation (Forest) - A formerly continuous forest that has been broken up into smaller pieces. http://www.epa.gov/ceisweb1/ceishome/atlas/maiaatlas/forest_fragmentation.html		N
		Fragmentation (Forest) - A term that refers to forest landscapes that are broken and not continuous. http://www.wildlandsprojectrevealed.org/htm/glossary.htm#concepts		N
2001	CBD/SB STTA	Fragmentation (Forest) - Any process that result in the conversion of formerly continuous forest into patches of forest separated by non-forested lands. http://unfccc.int/files/methods_and_science/lulucf/applications/pdf/060830_killmann.pdf and http://www.biodiv.org/programmes/areas/forest/definitions.asp		N
	USA VT	Fragmentation (Forest) - Breaking up a specific habitat into smaller unconnected areas. A habitat area that is too small may not provide enough space to maintain a breeding population of the species. http://www.anr.state.vt.us/champ/atlas/html/glossary.htm#h		N
		Fragmentation (Forest) - Breaking up large areas of continuous natural habitat into smaller patches of natural habitat isolated from each other by human-altered habitat. http://www.northern.edu/natsource/BIRDS/Conser1.htm		Y
	USA USFS	Fragmentation (Forest) - Breaking up of contiguous areas into progressively smaller patches of increasing degrees of isolation from each other. http://www.fs.fed.us/r9/cnnf/natres/plan/glossary.html#[%20F%20]		N
		Fragmentation (Forest) - Creating smaller areas of habitat from a large continuous habitat tract, such as removing a block of trees from a forested area. The road built through the prairie resulted in fragmentation of the habitat. http://www.inhs.uiuc.edu/chf/pub/virtualbird/glossary.html		N
		Fragmentation (Forest) - Cutting swaths and patches out of the forest. http://www.epa.gov/maia/html/lessons.html		Y
	USA VT	Fragmentation (Forest) - Division of a large forested area into smaller patches separated by areas converted to a different land use. http://www.state.vt.us/anr/fpr/forestry/ucf/glossary.htm		Y
	USA USMC	Fragmentation (Forest) - Division of a large land area (e.g., forest) into smaller patches isolated by areas converted to a different land type. http://www.cpp.usmc.mil/base/environmental/inrmp/0_glos		N

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		sary.PDF		
		Fragmentation (Forest) - Forest landscapes that are broken and not continuous. http://www.wildlandsprojectrevealed.org/htm/glossary.htm		N
	USA NASA	Fragmentation (Forest) - Fragmentation of forest types http://www.hq.nasa.gov/iwgsdi/ISS_SDI_Biodiversity.htm		N
		Fragmentation (Forest) - Islands of forest habitat that persist on the land when the intervening forest has been removed. http://depts.clemson.edu/extfor/publications/fortp19/definitions.htm		N
	UK	Fragmentation (Forest) - Occurs when a large area of a particular habitat is broken up into smaller patches (fragments) by human activities. http://www.mered.org.uk/saraweb/refs/glossary.htm		N
	Canada BC	Fragmentation (Forest) - Occurs when large continuous forest patches are converted into one or more smaller patches surrounded by naturally disturbed or developed areas. http://www.for.gov.bc.ca/hfp/Planning/RPGLOSS/F.htm		N
	USA USGS	Fragmentation (Forest) - Patchwork conversion and development of forest sites (usually the most accessible or most productive ones) that leave the remaining forest in stands of varying sizes and degrees of isolation http://www.npwrc.usgs.gov/resource/literatr/avian/avian.htm#f		N
		Fragmentation (Forest) - Process of changing a large forested area into an area of forest patches http://www.dsisd.k12.mi.us/mff/Environment/EcologyForests.htm		N
	USA USFS	Fragmentation (Forest) - Process of reducing size and connectivity of stands that comprise a forest, eventually isolating forest stands; the creation of habitat islands through harvest, land development or through natural causes such as fire. http://www.r5.fs.fed.us/sixrivers/publications/feis/appedix/g.pdf		N
		Fragmentation (Forest) - Subdivision of a forest (or other habitat) into isolated patches, reducing the size and connectivity of stands that compose a forest or landscape. http://fscus.org/html/about_fsc/who_we_are/glossary_of_terms.html#f		N
		Fragmentation (Forest) - The breaking up of a habitat, ecosystem or land-use type into smaller, often isolated, parcels, thereby reducing the number of species that the habitat, ecosystem or land-use type can support. http://www.theebi.org/pdfs/glossary.pdf		N
	USA NV	Fragmentation (Forest) - The breaking up of an organism's habitat into discontinuous chunks, particularly for organisms that have difficulty moving from one of those chunks to another. Fragmentation can be caused by removal of vegetation over large areas for human development, or even by small roads breaking up the		Y

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		habitat of (for example) amphibians that are resistant to crossing roads or are frequently killed when crossing roads. Power lines can fragment sage grouse habitat by providing convenient perches for predators such as hawks and ravens. http://www.state.nv.us/nvnhp/ecology/glossary.htm		
		Fragmentation (Forest) - The breaking up of extensive landscape features into disjunct, isolated, or semi-isolated patches as a result of land-use changes http://bch-cbd.naturalsciences.be/belgium/glossary/glos_f.htm		N
		Fragmentation (Forest) - The breaking up of habitat into discrete islands through modification or conversion of habitat by management activities. http://www.streamnet.org/pub-ed/ff/Glossary/glossaryhabitat.html		Y
		Fragmentation (Forest) - The breaking up of large habitats into smaller, isolated chunks. http://www.internet.ve/wildlife/glosario.htm and http://www.nationalgeographic.com/wildworld/glossary.html		N
		Fragmentation (Forest) - The breaking up of something into small, separated pieces. http://www.museum.state.il.us/muslink/forest/htmls/con_frag.html		N
	Canada	Fragmentation (Forest) - The breaking up of the forest into isolated patches through agriculture and urban development. http://www.unbf.ca/forestry/centers/cwru/soe/gloss.htm		Y
	USA USFS	Fragmentation (Forest) - The break-up of a large land area (such as a forest) into smaller patches isolated by areas converted to a different land type. The opposite of connectivity. http://roadless.fs.fed.us/documents/feis/glossary.shtml		Y
	USA NPS	Fragmentation (Forest) - The break-up of continuous habitat by roads, development, or other physical or biological barriers. http://www.nps.gov/olym/edgloss.htm		N
	Canada	Fragmentation (Forest) - The break-up of extensive habitats into small, isolated patches that are too limited to maintain their species stocks into the indefinite future. http://www.ameteam.ca/glossary.html		N
	Canada	Fragmentation (Forest) - The carving into parcels or "fragments" of a natural landscape due to such things as cutlines, roads, and other types of clearings. This disturbance is thought to be a major threat to biodiversity because of the creation of barriers to species movement as well as edge effects. http://www.alpac.ca/Forest_Management/image/dfmp%20glossary.pdf		Y
		Fragmentation (Forest) - The change in the forest landscape, from extensive and continuous forests of old-growth to mosaic of younger stand conditions. http://www.streamnet.org/pub-ed/ff/Glossary/glossaryforest.html		N

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		Fragmentation (Forest) - The disintegration, collapse, or breakdown of the norms. http://www.chias.org/www/edu/cse/owpglo.html		N
		Fragmentation (Forest) - The disruption of extensive habitats into isolated and small patches. Fragmentation has two negative components of biota: loss of total habitat area, and smaller, more isolated remaining habitat patches. https://osiris.cso.uiuc.edu/denix/Public/ES-Programs/Conservation/Biodiversity/glossary.html and https://www.denix.osd.mil/denix/Public/ES-Programs/Conservation/Biodiversity/glossary.html		N
	Canada NRCAN	Fragmentation (Forest) - The division of a continuous block of forest or other wildlife habitat into disconnected units as a result of human or natural disturbances. http://www.nrcan.gc.ca/cfs/proj/ppiab/ci/gloss_e.html		N
	USA USFS	Fragmentation (Forest) - The insularization of habitat on a landscape. http://www.srs.fs.fed.us/sustain/report/terra1/terra1-10.htm		N
		Fragmentation (Forest) - The phenomenon of large forested landscapes being broken into separate ownerships and often developed. http://www.forestsyste.ms.com/glossary/glossary.htm		Y
		Fragmentation (Forest) - The process of reducing size and connectivity of stands that compose a forest. http://www.streamnet.org/pub-ed/ff/Glossary/glossaryforest.html		N
		Fragmentation (Forest) - The process of spatial segregation among entities that need to be together in order to function optimally http://themes.eea.eu.int/Sectors_and_activities/transport/indicators/consequences/fragmentation/Fragmentation_TERM_2001.doc.pdf		N
		Fragmentation (Forest) - The process of transforming large continuous forest patches into one or more smaller patches surrounded by disturbed areas. This occurs naturally through such agents as fire, landslides, windthrow and insect attack. In managed forests timber harvesting and related activities have been the dominant disturbance agents. http://www.borealforest.org/nwgloss4.htm and http://typhoon.sdsu.edu/nasa_lcluc/forest.html		N
		Fragmentation (Forest) - The process whereby a large patch of habitat is broken down into many smaller patches of habitat, resulting in a loss in the amount and quality of habitat. http://chesapeake.towson.edu/landscape/forestfrag/glossary.asp		N
	Australia	Fragmentation (Forest) - The result of broad scale clearing of native vegetation and the small parts of that vegetation that remain often only as isolated patches. http://audit.ea.gov.au/ANRA/vegetation/docs/Native_vegetation/nat_veg_glossary.cfm		N
		Fragmentation (Forest) - The segmentation of a large		Y

Year	Org.	Definition/Source	Emphasis	Human-Induced Only
		tract or continuous tracts of forest to smaller patches often isolated from each other by nonforest habitat. Results from the collective impact of residential and commercial development, highway, and utility construction, and other piecemeal land use changes http://www.pfmt.org/glossary/f.htm		
		Fragmentation (Forest) - The spatial arrangement of successional stages across the landscape as the result of disturbance; often used to refer specifically to the process of reducing the size and connectivity of late successional or old-growth forests. http://www.lvwva.org/forest_study/dynamic/glossary.htm		N
		Fragmentation (Forest) - The splitting of forestlands into smaller, detached areas as a result of road building, farming, suburban development, and other activities. http://www.sfrc.ufl.edu/Extension/ssfor11.htm		Y
	USA MD	Fragmentation (Forest) - The subdivision of large natural landscapes into smaller, more isolated fragments. http://www.dnr.state.md.us/forests/gloss.html		N
		Fragmentation (Habitat) – Fragmentation of habitats occur when a continuous has become divided into separate, often isolated small patches interspersed with other habitats. http://www.cbd.int/cepa/toolkit/html/resources/FD/EDF8CF88-237B-46EE-BB5F-42304D735C23/Biodiversity%20Glossary.pdf		N
	USA USFS	Fragmentation (Habitat) – The break-up of a large land area (such as a forest) into smaller patches isolated by areas converted to a different land type. The opposite of connectivity (12). http://www.fs.fed.us/hellscanyon/about_us/planning/cmp/00_feis/10_glossary.pdf		N

Annex 2 - Developing a Standard Definition

We need standard or common definitions when we want to compare data between entities or over time or when we want to combine and aggregate data from different sources for upward reporting. When developing a standard or common definition such as 'forestland', 'degraded forest', etc, I have found it helpful to test to see how others would interpret the wording. For example, during FAO's 1996 Kotka III meeting on Forest Resource Assessment (FRA) 2000, we (some 32 country experts and representatives from major international agencies and NGOs) agreed to the definition that FAO now uses for global reporting.

To see if the experts were able to consistently use the new definition of forest land, I gave a non-scientific test using 26 slides of various vegetation conditions. For each slide, I asked three questions: 1) how would you classify the scene (forest, other wooded, trees outside forest land, other), 2) why did you classify the lands that way, and 3) in situations where the land is not classes as forest, and considering the need for data on carbon storage, biodiversity, etc, should we include these land and the resources they contain in the next assessment?

The results of the first part showed that most participants agreed on what areas were covered by trees, but not necessarily on if the land was 'forest' or not. There was some confusion about if the 10 percent canopy cover applied to the current situation or to some point in the future. There was also confusion about how to classify plantations of rubber, oil palms, and orchards or if these lands should be included in the assessment. The only things that they 100 percent agreed upon was the classification of a sand dune and parking lot! (Lund 1997). The test shows that even if we have a standard definition, people will interpret and use it differently.

I have since given similar tests in Italy, Spain, Mexico, Ireland, Costa Rica and in the US in Washington State, Washington DC, South Dakota, Maine, Delaware, Oregon, and Hawaii to a variety of people (foresters, range managers, remote sensing experts, arborists, etc.). Some times I would provide a definition such as FAO's, let the participants develop there own common definition and at other times I asked them to write down and use a definition they would like to have. In addition to identification of forest, I tested people's interpretations of 'rangeland' (Lund 2007) and 'deforestation' (ARD and Grupo Darum 2002). In every test, people strayed from the definition being tested – they included lands where they should not and excluded areas when they should.

I think the ideal way to develop a standard is to test it against a variety of situations and modify it where people's interpretations differ.

If you are trying to develop a standard definition for 'Forest Degradation' and 'Degraded Forest', consider testing peoples' interpretation and use of the wording before finalizing. The following is an example quiz.

'Forest Degradation' Definition Quiz

There are an abundance of definitions for forest degradation and degraded forest (Lund 2002a). In simplest terms, 'Forest degradation' is the process of reducing the quality of the resource. A 'degraded forest' is the result of such action. Forest degradation could lead to deforestation for which there are many definitions in use (Lund 2008). Again, in the simplest terms, 'deforestation' is the act of removing the forest.



The land in this image falls in the tropical rainforest biome. The area is a designated forest preserve, used for protecting the watershed and wildlife and for preserving a rich biological diversity. The above image shows what the area looked like on 11 January 2007 (Photos by E. Duarte, OUVCOR-UNA, Costa Rica).



This image shows how the same area looked on 9 January 2009. The loss in tree cover was immediate and caused by the 8 January 2009 earthquake.

Quiz

In your opinion and based upon your definition of 'forest degradation' and 'degraded forest'.

1. Is this degraded forest land? If not what how would you label the change?
2. Are the bare areas 'deforested?' If not, how would you classify the lands?

Discussion

If your definition of degraded is limited to human-induced changes, then this area cannot be considered degraded.

The word 'forest' may refer to a type of land cover, land use, administrative unit, or an ecological potential (biome, climax, etc) (Lund 2002b).

If one's definition of 'forest' is one based upon biomes, administration, or land use then the bare areas in the above image cannot be labeled as 'deforested' as the land still qualifies as forest. If your definition is based upon cover, then we can call the bare areas deforested.

If you consider the bare areas to be deforested, then we cannot label the area degraded forest land as it is no longer considered forest.

If you wish the area above to be classed as 'degrade forest,' what needs to be included in the definition to make it so?

Annex 3 – Additional references for you reading pleasure.

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