Ten Years of Mapping and Monitoring Intact Forest Landscapes in the Tropics

Ilona Zhuravleva
Greenpeace Russia
2011

www.greenpeace.org
Greenpeace Worldwide
Mapping Units

- International non-governmental organisation “Greenpeace” – 28 offices in 43 countries
- GIS Units in 3 offices (Russia, Brazil, Indonesia)

FOCUS on FORESTS

Greenpeace integrates GIS data and tools into its campaign work in order to have clear evidence of forest loss (it is crucial to work and lobby on the base of credible figures and data)
Forests of the World

Vegetation Continuous Fields, 2000
(Global 500m Tree Cover Product from MODIS)

Starting Point in 2000
Why are Large Intact Forests Important?

- Better **recovering from disturbances** (resistance and resilience)
- Important for the preservation of all strata of **biological diversity**
  (especially for large animals)
- **Maintaining ecological processes and supplying ecosystem services** like water and air purification, nutrient cycling, carbon sequestration, erosion, and flood control
- **High conservation value** + low economic value = easy to protect

The United Nation’s Convention on Biological Diversity (CBD) has realised the importance of large intact forests and other intact ecosystems (see, e.g. Tech Series 41). In the UN Framework Convention on Climate Change (UNFCCC) discussions on Reducing Deforestation and Degradation in developing countries (REDD), emerges the importance of preserving natural forests and IFLs are the backbone of the world’s natural forests.

“In largely intact forest landscapes where there is currently little deforestation and degradation occurring, the conservation of existing forests, especially primary forests, is critical both for preventing future greenhouse gas emissions through loss of carbon stocks and ensuring continued sequestration, and for conserving biodiversity.”

- (CBD 2009)
Intact Forest Landscape (IFL)

An unbroken expanse of natural ecosystems within the zone of current forest extent, showing no signs of significant human activity and large enough that all native biodiversity, including viable populations of wide-ranging species, could be maintained.

Source:
IFL Size Criteria

Areas within today's global extent of forest cover which contains forest and non-forest ecosystems minimally influenced by human economic activity:

- Larger than 50,000 ha

- At least 10 km wide at the broadest place (measured as the diameter of the largest circle that can be fitted inside the patch)

- At least 2 km wide in corridors or appendages to areas that meet the above criteria
Disturbed Areas Exclusion Algorithm

Step 1. Forest Zone
Defining

Forest zone: all forests with tree canopy density greater than 20% if the distance between them is less than 2 km and all non-forest plots which are fully surrounded by forests. Fragments of the forest zone smaller than 50,000 ha were not considered in the analysis.

Step 2. Developed Areas
Analysis

“Negative” approach. Exclusion of deforested areas and small fragmented patches based on infrastructure maps.
“Inverse” logic. Checking large forested areas for indications of active or recent use (clearing for agriculture, logging, and infrastructure development) based on satellite images.

What was excluded:

- Populated places
- Infrastructure line objects (buffer of 1km on each side was applied): roads, railways, navigable waterways, seashore, pipelines and power transmission lines
- Areas used for agriculture and timber production
- Areas affected by industrial activities during the last 30-70 years (logging, mining, oil and gas, peat exploration, etc)
History of IFL Mapping

IFLs of North European part of Russia (2001)

Boreal IFLs of Russia, Canada, USA, Sweden, Finland, north parts of Japan and China (2003)

IFLs of Russia (2002)
The World’s IFLs (2006). Key Findings

- IFL area – 13.1 million km² (23.5% of the forest zone)

- Most of the IFL consist of closed forests (64.5%), with the remainder spread over open forests and woodlands (20.5%), and non-forest ecosystems (15.0%)

- The vast majority of IFL – in two biomes: Humid Tropical and Boreal forests. The lowest proportion of IFLs – in Temperate forests

- IFLs exist in 66 of the 149 countries within the forest zone. Most of IFLs (90%) occur in 13 countries, and three of them – Canada, Russia and Brazil – contain 63.8% of the world's entire IFL area

- Less then 19% of IFLs have some form of protection, 9.7% – are strictly protected (according to IUCN categories I-III of protected areas). The protection percentage is the highest for Temperate forests and lowest for Boreal forests (less than 4.4%). Comparing continents, the protection percentage is lowest in Asia. Some Asian countries – China, Cambodia, Laos, Vietnam – have placed little or none of their IFL area under protection
IFLs Monitoring

Northern European Russia

Tropics

Non-boreal Europe

IFLs in Northern European Russia, Russia, 2007

Country IFLs. Democratic Republic of the Congo, 2011

Retezat National Park, Retezat-Godeanu-Tarcu IFL, Romania, 2009
World IFLs Monitoring – Focus on Tropics

Brazilian Amazon
Brazil

Congo Basin
Democratic republic of the Congo
Republic of Congo
Gabon
Cameroon
Central African Republic
Equatorial Guinea

Paradise Forests
Indonesia
Papua – New Guinea

Intact Forest Landscapes (IFL)
Forest zone outside IFL

GREENPEACE
www.greenpeace.org
Monitoring Focus on Tropics - Reasons

- **30% world IFLs** in 9 tropical countries

- Humid tropical biome is one of two (the second is Boreal biome) where **IFLs mostly are concentrated**

- Tropical forests do have a **higher biodiversity** than other forests

- The lowest chance of survival where economies are predominantly **based on export**

- The **highest rate of deforestation** (Paradise forests)

- Deforestation of peatforests (Indonesia) is releasing a huge amount of **carbon emissions**
Cycle of IFL Destruction

1. Fragmentation
2. Degradation
3. Deforestation

- Roads
- Selective logging
- Agro-industrial clearing
Main Drivers of IFLs Degradation in Tropics

Brazilian Amazon
- Soy Industry
- Cattle Farming

Congo Basin
- Industrial Logging
- Upcoming Commercial Plantations
- Population Growth

Paradise Forests
- Palm Oil Industry
- Pulp & Paper Industry

Lack of Governance, Transparency, Control and Monitoring; Corruption
Weak forest policies, laws and/or law enforcement
Export-oriented Economics
Monitoring Process
Monitoring Process
Monitoring Process

IFL Loss 2005-2010

IFL Loss 2000-2005

IFL Area 2010
Current State of Tropical IFLs
2010

371,135 ha * 1000
(equal ½ Australia)

Brazilian Amazon: 63%
Congo Basin: 24%
Paradise Forests: 13%

www.greenpeace.org
### Tropical IFLs Loss 2000/2005/2010

<table>
<thead>
<tr>
<th></th>
<th>% IFL change 2000-2005</th>
<th>% IFL change 2005-2010</th>
<th>IFL change trend</th>
<th>% IFL change 2000-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOTAL TROPICS</strong></td>
<td>4.0</td>
<td>2.0</td>
<td>↓ 2</td>
<td>5.9</td>
</tr>
<tr>
<td>Brazil (Amazon)</td>
<td>4.1</td>
<td>1.1</td>
<td>↓ 3 ¾</td>
<td>5.2</td>
</tr>
<tr>
<td>Congo Basin</td>
<td>3.5</td>
<td>2.0</td>
<td>↓ 1 ¾</td>
<td>5.5</td>
</tr>
<tr>
<td>Paradise forests</td>
<td>4.9</td>
<td>5.7</td>
<td>↓ 1 ½</td>
<td>10.4</td>
</tr>
</tbody>
</table>

IFL loss in absolute areas 2000-2010

24,000 ha*1000 (≥ Israel area)
IFL Change Proportions in 2000-2010

- More then half of all IFL change occurred in Brazil (Amazon)

- Paradise Forests and Congo basin lost approximately one and the same IFL area – quarter of all IFL changes

- More then 80% of all change in Congo Basin is located in 3 countries (Republic of the Congo, Gabon, Democratic Republic of the Congo)

- Approximately 70% of all changes in the Paradise Forests are located in Indonesia - the other 30 % are located in Papua New Guinea

Brazil (Amazon)

- 100%

- Brasilia (Amazon)

Congo Basin

- 31%
- 24%
- 27%
- 15%
- 1%

- Republic of the Congo
- Gabon
- Democratic Republic of the Congo
- Cameroon
- Central African Republic
- Equatorial Guinea

Paradise Forests

- 33%
- 67%

- Indonesia
- Papua New Guinea
# IFL Loss Rates – Country Analysis

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil (Amazon)</td>
<td>4.1</td>
<td>1.1</td>
<td>3 ¾</td>
<td>5.2</td>
</tr>
<tr>
<td>Democratic Republic of Congo</td>
<td>1.0</td>
<td>0.9</td>
<td>= 1</td>
<td>1.9</td>
</tr>
<tr>
<td>Republic of Congo</td>
<td>8.4</td>
<td>3.3</td>
<td>2 ½</td>
<td>11.4</td>
</tr>
<tr>
<td>Gabon</td>
<td>8.7</td>
<td>4.8</td>
<td>1 ¾</td>
<td>13.1</td>
</tr>
<tr>
<td>Cameroon</td>
<td>10.2</td>
<td>5.2</td>
<td>2</td>
<td>14.9</td>
</tr>
<tr>
<td>Central African Republic</td>
<td>2.4</td>
<td>12.4</td>
<td>5</td>
<td>14.5</td>
</tr>
<tr>
<td>Equatorial Guinea</td>
<td>11.7</td>
<td>2.5</td>
<td>4 ¾</td>
<td>13.9</td>
</tr>
<tr>
<td>Indonesia</td>
<td>4.3</td>
<td>5.9</td>
<td>1 ¼</td>
<td>10.0</td>
</tr>
<tr>
<td>Papua-New Guinea</td>
<td>6.4</td>
<td>5.3</td>
<td>1 ¼</td>
<td>11.4</td>
</tr>
</tbody>
</table>

- Countries with more than 10% IFL loss during 2000-2010
IFL Loss in Tropics: Brazilian Amazon

- IFL loss (deforestation or degradation) in 2000-2005
- IFL loss (deforestation or degradation) in 2005-2010
- IFL area 2010

BRASIL
IFL Loss in the Tropics: Paradise Forests

- IFL loss (deforestation or degradation) in 2000-2005
- IFL loss (deforestation or degradation) in 2005-2010
- IFL area 2010
In 3 provinces of Indonesia (Maluku Utara, Riau, Sumatera Utara) and 2 provinces of Papua New Guinea (Gulf, West New Britain), the rate of IFL loss (deforestation and degradation) in 2000-2005 is higher than 10%.
IFL Mapping and Monitoring Implementation: 
The Forest Stewardship Council (FSC) Certification Process

- The Definition of **High Conservation Value Forest** category 2 (HCVF2) used in Principles and Criteria for Forest Stewardship (FSC 2004) is **similar** to that of Intact Forest Landscapes. The Principles claim intactness values to be preserved as a condition for getting certified.

- In the FSC Controlled Wood standard (FSC 2006) **IFL are directly mentioned** among other categories of High Conservation Value Forests

- Some **regional FSC standards** like the Russian one **incorporated IFLs** (in addition to HCVF)

---

Russia. Komi Republic. The scheme for NROs and “IlimSeverLes” agreement. 2008

Russia. Karelia Republic. Moratorium agreement between NRO “SPOK” and “Ledmozerskoe” timber company. 2009

Canada. Agreement between 9 NGOs and Forest Products Association of Canada. 2010
IFL Mapping and Monitoring Implementation:

Moratoriums are time-bound and therefore no long-term protection

Example of violation of a moratorium on IFL area in the North West of Russia
IFL Mapping and Monitoring Implementation: Protected Area example

Example of IFL Conservation in the Far East of Russia

Half of National Park “Udegeiskaya Legenda” is IFL

The north part of the Park is given for local communities (the Udegheis) for forestry

Russia, Primorsky kray, 2007
Spot 2/4, IRS-1C/1D
© Scanex, © NASA, © Transparent World

Green line – IFL border
Red line – National Park border

Part given to the Udegheis

Half of National Park “Udegeiskaya Legenda” is IFL

The north part of the Park is given for local communities (the Udegheis) for forestry
IFL Mapping and Monitoring Implementation:
Protected Areas in Tropics

• While the average figure of IFLs under strict protection* is 9.7%, the average figure in the Tropics is lower, only 6.7%

• 11.5% of Paradise Forest’s, 8% of the Congo Basin’s, 5% of the Brazilian Amazon’s IFL area are strictly protected

• Only 0.03% of Gabon IFLs are strictly protected. There are no Protected Areas in Papua New Guinea

• The largest portion of IFL protected areas are in Equatorial Guinea – more than 40% of IFL area are strictly protected; in Cameroon, Indonesia and Republic of the Congo, more than 10% are protected

* IUCN categories I-III according to UNEP/IUCN World Database on Protected Areas (which in most countries doesn’t guarantee strict implementation on the ground)
Advantages and Limitation of IFL Concept

+ Globally consistent map
+ Based on an up-to-date, precise data source while earlier analyses have relied on expert data, existing small-scale maps, or small-scale maps combined with low-resolution satellite-derived data sets

- Criteria designed for use with remotely sensed data. They seem to underestimate some types of disturbances that are difficult to detect in satellite imagery (selective logging, small-scale agriculture)
- Criteria are not sensitive to regional variations in the understanding of “intactness” and “disturbance”
- Created with visual interpretation of images by experts, may contain inconsistencies and inaccuracies (spatial resolution, lack of information about local land-use practices)
- Difficult to always find satellite images from the same year

Results are generally not immediately suitable for local-scale conservation planning. They may be used as a framework for such projects to complement additional locally relevant information.

There is a certain degree of subjectivity in determining IFL boundaries across transition zones from intact to disturbed areas. Allows to capture the effects of recent disturbances that were not captured in previous studies.
Open Questions and Discussion

- The concept is not known everywhere - how to better distribute it beyond Greenpeace channels?

- How to get IFL protection into legally binding policies and regulations at different levels (including appreciating and implementation IFL concept by international conventions and processes)?

- How to better integrate and use synergies with other conservation concepts?

- How to deal with the fact that the majority of remaining IFLs are situated in just a few countries and they’ll be against complete protection of them
Thank you for attention!

Ilona Zhuravleva  
GIS Lab Head of Greenpeace Russia

ilonazhuravleva@greenpeace.org  
+7 (495) 988-74-60  
Skype: zhilona

Moscow, Leningradskiy prospekt, 26, b.1

www.greenpeace.org  
www.intactforests.org