



# Deforestation in Developing Countries

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# Outline

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## ❖ **Global Deforestation**

- ❖ Definitions of Deforestation
- ❖ History of Global Deforestation
- ❖ The World's Forest Areas
- ❖ Largest Forest Areas in the World
- ❖ Global Tropical Forests
- ❖ Causes and Effects of Deforestation

## ❖ **Deforestation in Developing Countries**

- ❖ Definition of Developing Countries
  - ❖ Lists of Developing Countries
- ❖ Forest Areas in the Developing Countries
- ❖ Deforestation in Selected Countries
- ❖ Case Study in Indonesia

## ❖ **Solutions and Future Direction**

- ❖ Future Direction of Deforestation
  - ❖ How to stop the Deforestation
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# Definition of Deforestation

**Deforestation is the process in which natural forests are cleared/cut through logging and/or burning and converted to non-forests, either using for timber or for alternative uses (e.g., agriculture, residence, and industry)**



Source: SAF 2008; WWF





THE AFRICANS OF THE SLAVE BARK "WILDFIRE."—[FROM OUR OWN CORRESPONDENT.]

THE SLAVE DECK OF THE BARK "WILDFIRE," BROUGHT INTO KEY WEST ON APRIL 25, 1850.—[FROM A DAGUERTYPE.]

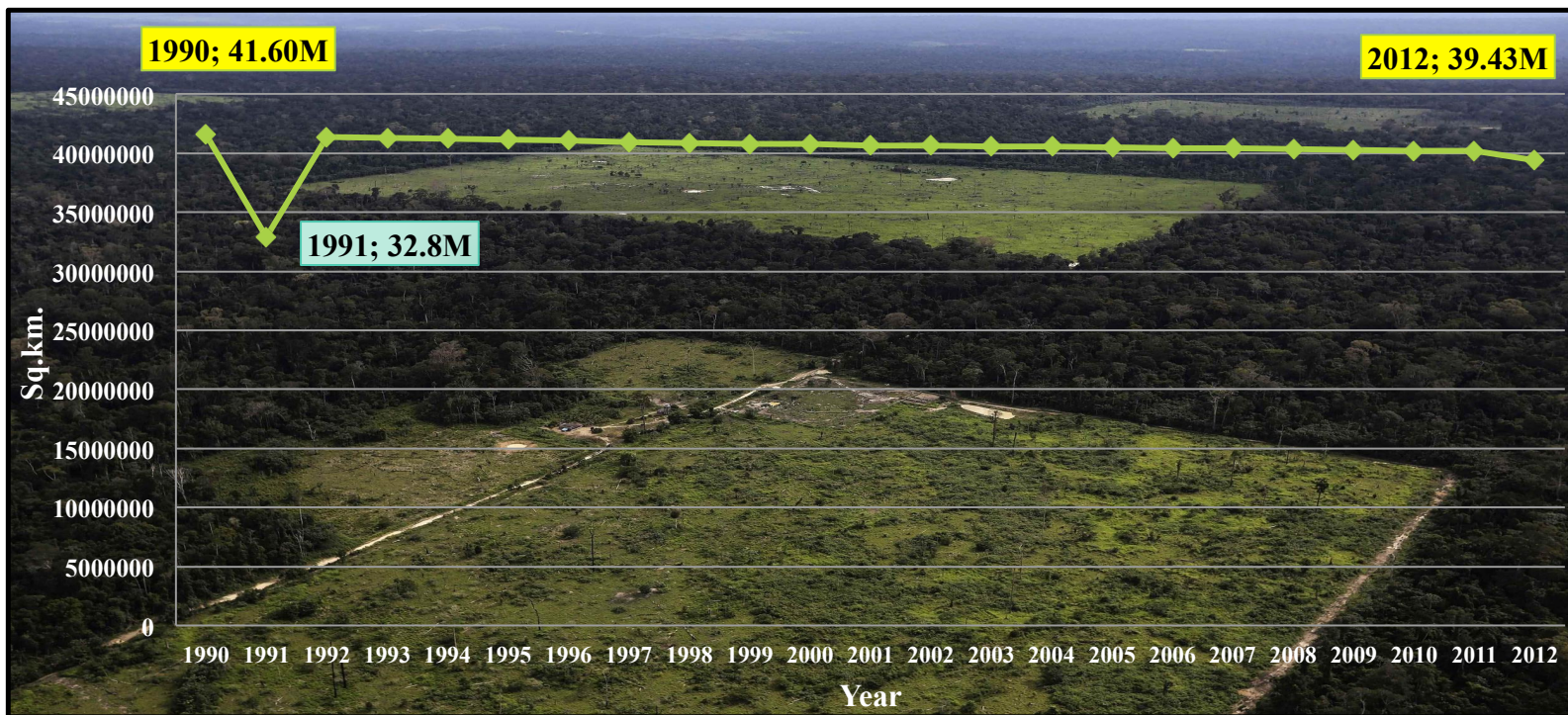
Source: Henzel 1980



# History of Global Deforestation

Year	Memo
1852	Deforestation sharply accelerated (Wilson 2002)
1990	Up to 90% of West Africa's coastal rainforests disappeared (National Geographic)
2005	UN-FAO reported total global forest areas was decreasing by about 13 million hectares per year (FAO 2010)
2007	Mexico, India, the Philippines, Indonesia, Thailand, Burma, Malaysia, Bangladesh, China, Sri Lanka, Laos, Nigeria, the Democratic Republic of the Congo, Liberia, Guinea, Ghana and the Ivory Coast lost large areas of their rainforests (FAO 2007)
2012	Indonesia had surpassed the rate of deforestation in Brazil, and become the fastest forest clearing nation in the world (Bachelard 2014)
2014	Half of deforestation in Indonesia occurred outside concession areas (Forest Watch Indonesia 2014)

# The World's Forest Areas



Source: The World Bank



# **Largest Forest Areas in the World**

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- 1. Russian Federation (8,092,100 Sq.km.)**
- 2. Brazil (5,151,332 Sq.km.)**
- 3. Canada (3,101,340 Sq.km.)**
- 4. The United States (3,047,876 Sq.km.)**
- 5. China (2,123,873 Sq.km.)**

# Global Tropical Forests

- ❖ Amazon basin of South America
- ❖ Congo river basin of Central Africa
- ❖ S.E. Asia
- ❖ Papua New Guinea
- ❖ Madagascar





# Causes of Global Deforestation

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- ❖ food
- ❖ feed
- ❖ fiber
- ❖ fuel
- ❖ and forest products



Source: Boucher et al. (2011); The Prince's Rainforest Project (2012)

# Effects of Global Deforestation

- Loss of Species
- GHG Emissions
- Water Cycle
- Soil Erosion
- Quality of Life



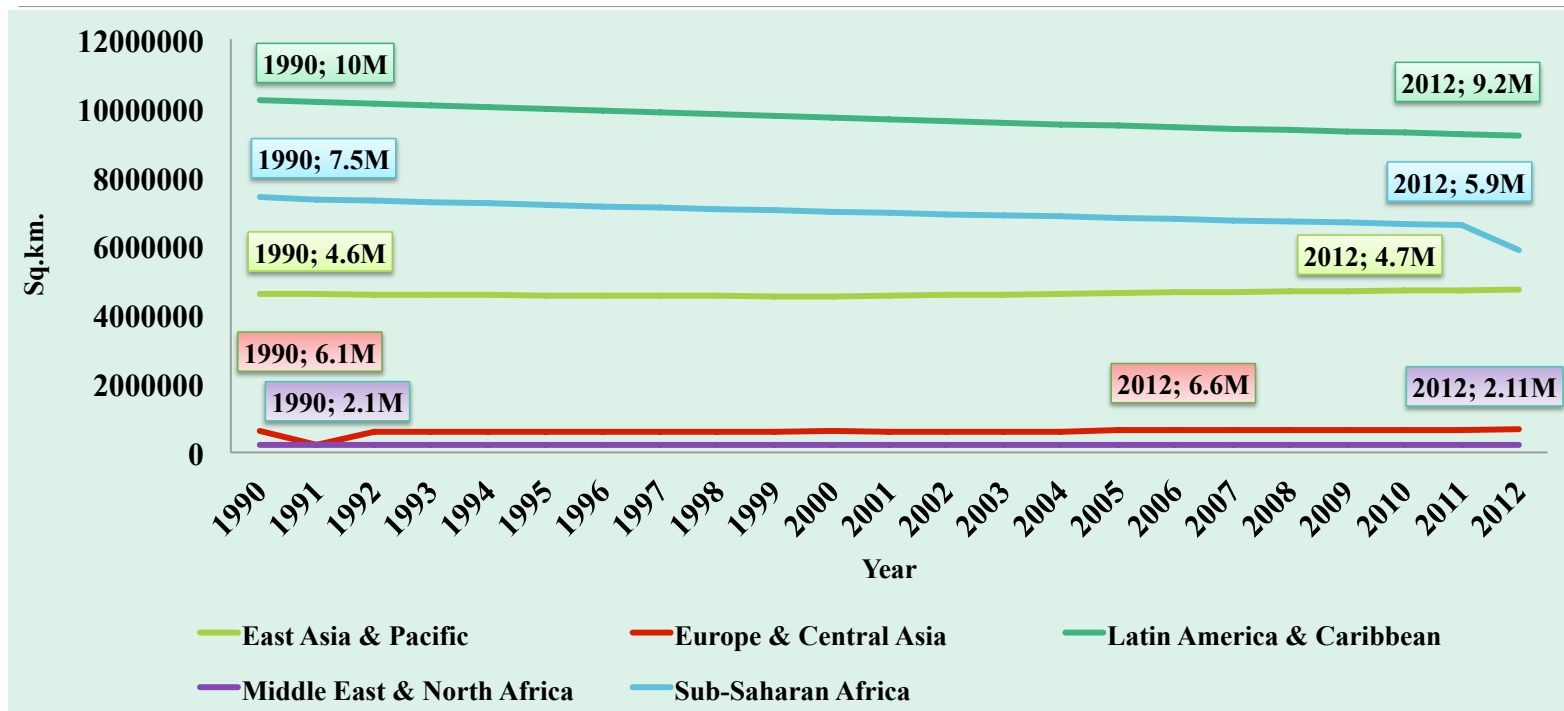


# Deforestation in Developing Countries

-  Algeria
  -  Argentina
  -  Armenia
  -  Azerbaijan
  -  Bahamas
  -  Bahrain
  -  Bangladesh
  -  Barbados
  -  Belarus
  -  Belize
  -  Benin
  -  Bolivia
  -  Bosnia and Herzegovina
  -  Botswana
  -  Brazil
  -  Brunei
  -  Bulgaria
  -  Cameroon
  -  Cape Verde
  -  Chile
  -  China
  -  Colombia
  -  Comoros
  -  Costa Rica
  -  Côte d'Ivoire
  -  Croatia
  -  Dominica
  -  Dominican Republic
  -  Ecuador
  -  Egypt
  -  El Salvador
  -  Equatorial Guinea
  -  Fiji
  -  Gabon
  -  The Gambia
  -  Georgia
  -  Ghana
  -  Grenada
  -  Guinea
  -  Guinea-Bissau
  -  Guyana
  -  Honduras
  -  Hungary
  -  India
  -  Indonesia
  -  Iran
  -  Jamaica
  -  Jordan
  -  Kazakhstan
  -  Kenya
  -  Kosovo
  -  Kyrgyzstan
  -  Lebanon
  -  Macedonia
  -  Malaysia
  -  Maldives
  -  Mauritius
  -  Mexico
  -  Moldova
  -  Mongolia
  -  Montenegro
  -  Morocco
  -  Mozambique
  -  Nicaragua
  -  Niger
  -  Nigeria
  -  Oman
  -  Palau<sup>[30]</sup>
  -  Panama
  -  Papua New Guinea
  -  Paraguay
  -  Peru
  -  Philippines
  -  Poland
  -  Romania
  -  Russia
  -  Saint Lucia
  -  Saint Vincent and the Grenadines
  -  Samoa
  -  São Tomé and Príncipe
  -  Senegal
  -  Serbia
  -  Seychelles
  -  Sierra Leone
  -  Solomon Islands
  -  South Africa
  -  Suriname
  -  Tajikistan
  -  Tanzania
  -  Thailand
  -  Togo
  -  Tonga
  -  Trinidad and Tobago
  -  Tunisia
  -  Turkey
  -  Turkmenistan
  -  Uganda
  -  Ukraine
  -  Uruguay
  -  Uzbekistan
  -  Vanuatu
  -  Venezuela
  -  Vietnam
  -  Zimbabwe
- Developing countries not listed by IMF**
-  Cuba
  -  Nauru
  -  North Korea

Source: IMF 2014; The World Bank 2013

# Forest Areas in Developing Countries by Region



Source: The World Bank



# Deforestation in Selected Countries

Country	Year 2011 (Sq.km.)	Year 2012 (Sq.km.)	Different (Sq.km.)	Different (%)
Brazil	5,173,276	5,151,332	-21,944	-0.42%
Indonesia	937,470	930,620	-6,850	-0.73%

Source: The World Bank

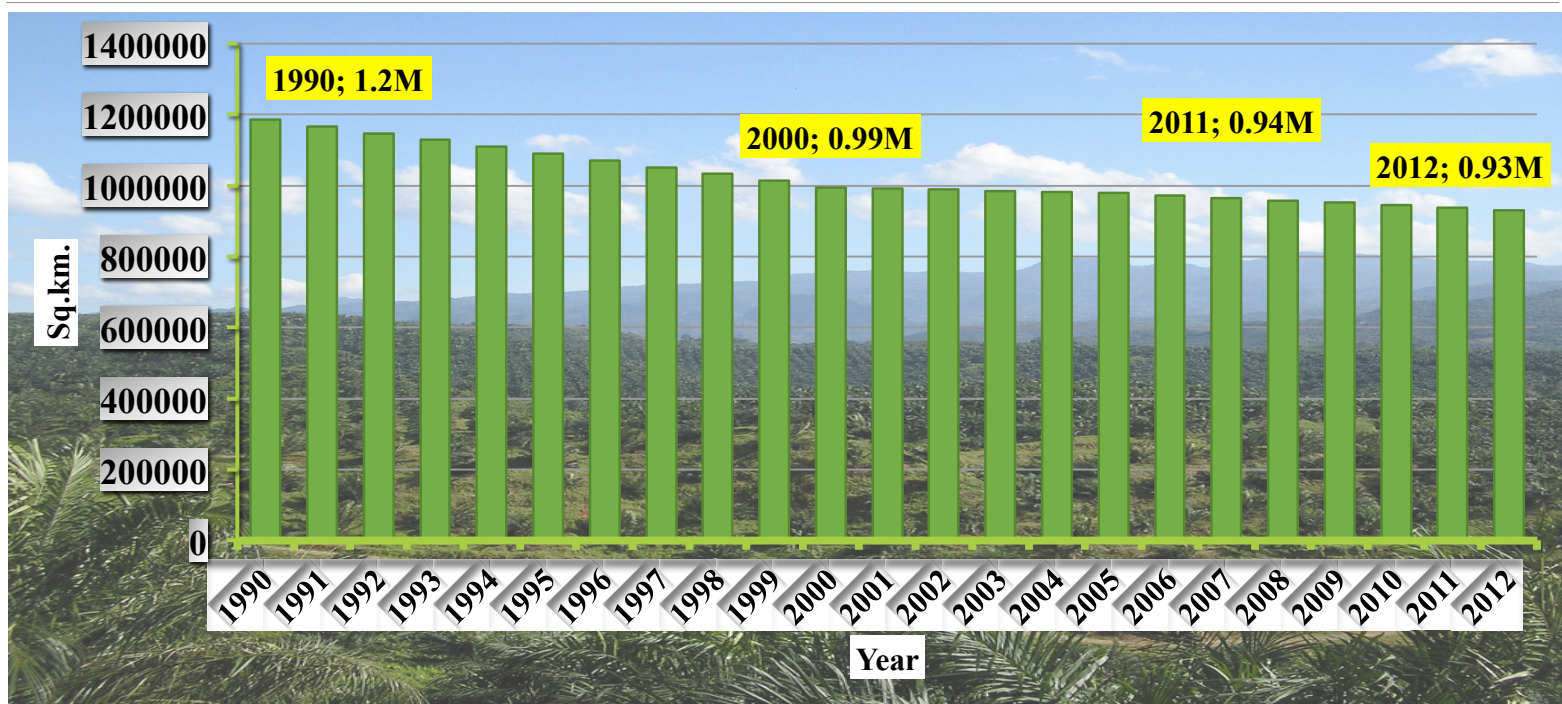
# World Map



Map of Indonesia

Source: CIA 2014

# Forest Areas in Indonesia



Source: The World Bank





Source: Lee et al. 2014



# Causes of Deforestation in Indonesia

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## 2.) Forest Fire: Poor logging practices, population growth, urban expansion, and volcano



Source: Alesina, Gennaioli and Lovo 2014; Jess and Madey 2013

# Causes of Deforestation in Indonesia

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## 3.) Logging



Source: Margono et al. 2012



# Causes of Deforestation in Indonesia



Source: Jess and Madey 2013





Source: Jess and Madey 2013





# Effects of Deforestation

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## ❖ Loss of Endangered Species



Sumatran Tiger



Rhino



Elephant



Orangutan



Pygmy Elephant



A photograph showing a large-scale forest fire. Thick, white smoke billows upwards from a cleared area where trees have been cut and are now being burned. The background shows a dense, green forest. The foreground is filled with charred wood and debris.

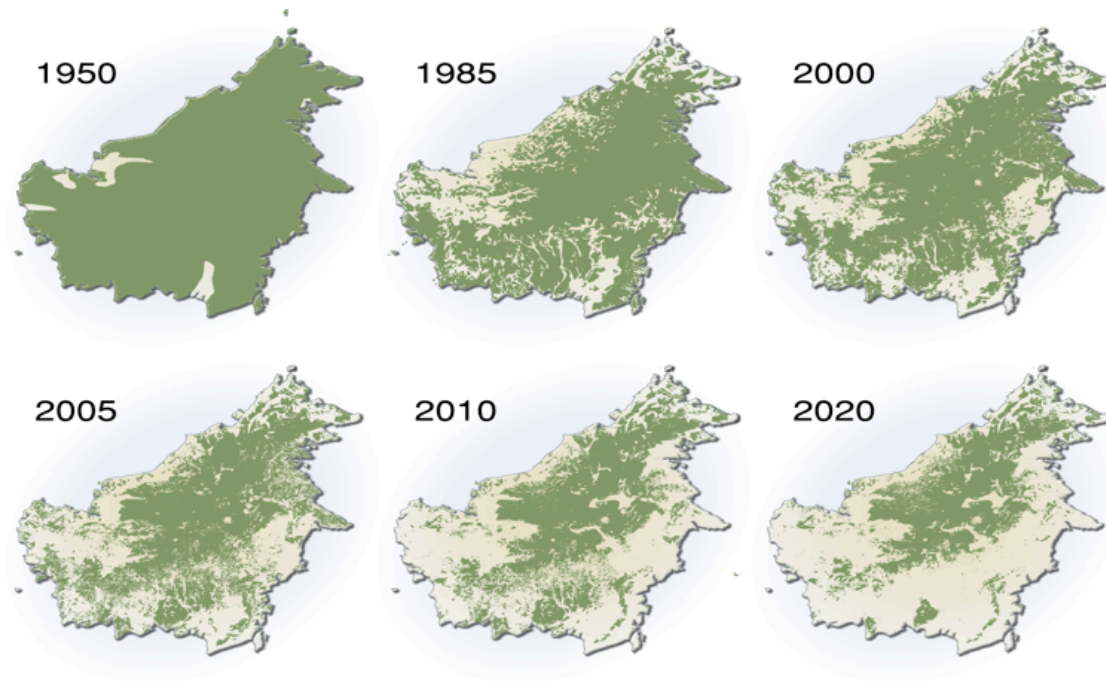
❖ **Greenhouse Gas Emissions:** National Council on Climate Change (2010) reported that 37% of Indonesia's greenhouse gas (GHG) emissions from deforestation.

**Trees actually become carbon sources when they are cut, burned, or otherwise removed.**

Source: Szalay 2013; WRI 2010

# Past, Present and Future in Indonesia

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Source: Jess and Madey 2013

# Solutions for Deforestation in Indonesia

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❖ **Certified sustainable palm oil (CSPO)** (UCS 2013)

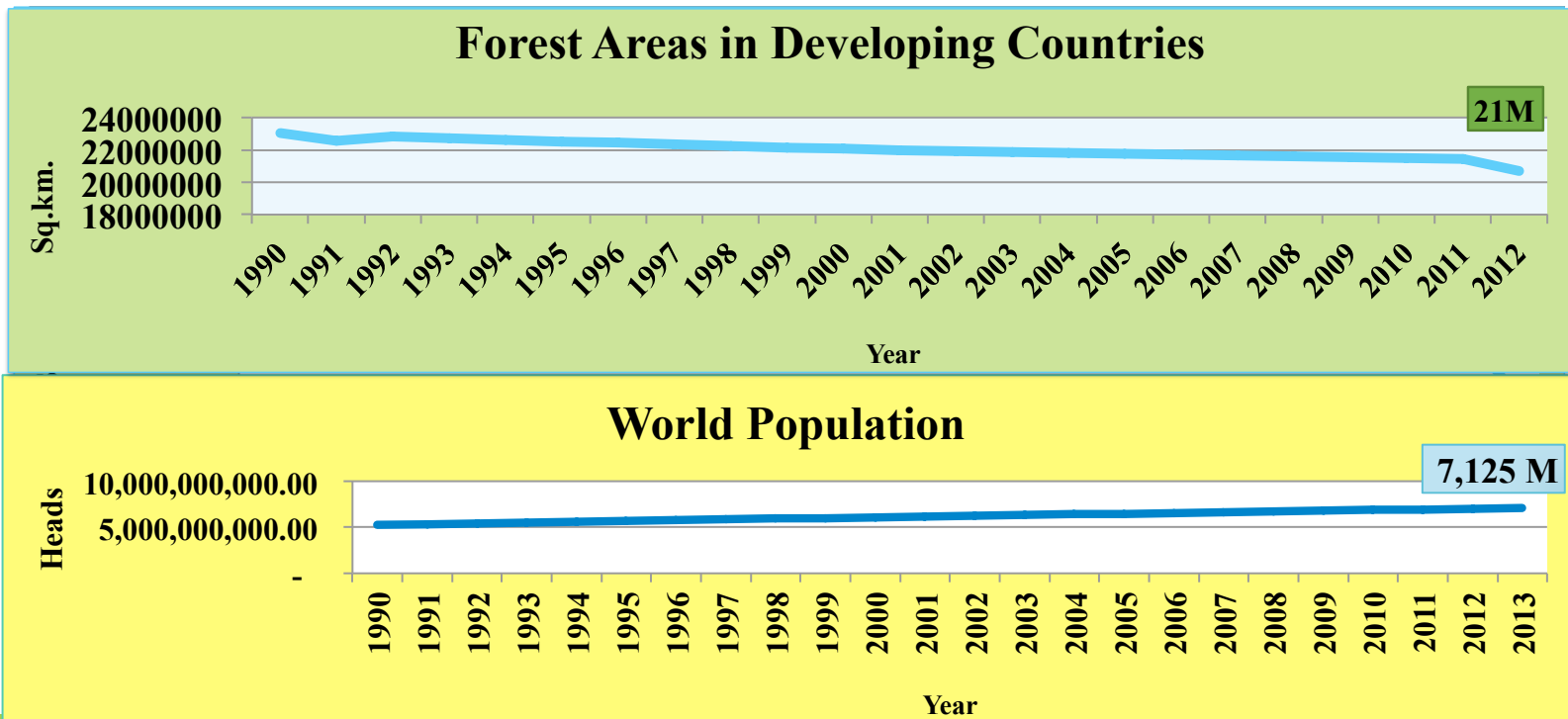
❖ **RED(D)+ Activities** (FCPF 2012)

❖ **Concessions** (France-Presse 2013; UCS 2013)

❖ **Reduction of Corruption** (Belford 2010)



# Future Direction of Deforestation



Source: The World Bank



# How to stop the deforestation

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**1. Forest policies or laws: Taxes, emission allowances, concessions** (Busch et al. 2015; Greenpeace 2014)

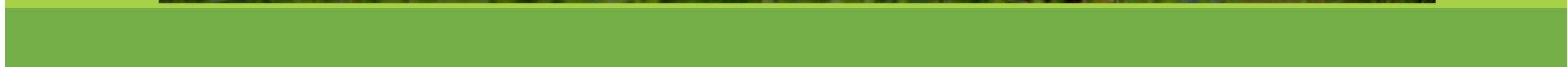
**2. Participation of land owners, corporations & markets for forest conservation: Cut and replace, tree bank** (Conserve Energy Future 2015 ; Satayamas and Kawtrakul 2004)

**3. Sustainable consumer options: Buying recycle wooden products** (Greenpeace 2014)

**4. Raising funds for RED(D)+** (Scholz and Schmidt 2008)



**Thank you**



# References

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- ❖ Alesina, A., C. Gennaioli, and S. Lovo. 2014, September). Public goods and ethnic diversity: Evidence from deforestation in Indonesia. Working Paper 20504, National Bureau of Economic Research.
- ❖ Bachelard, M. 2014. World's worst illegal logging in Indonesia. *The Sydney Morning Herald*, 30 June 2014.
- ❖ Belford, A. 2010. "Indonesia Agrees to Curb Commercial Deforestation". New York Times. Retrieved 30 May 2010.
- ❖ Boucher, D. H., P. Elias, K. Lininger, C. May-Tobin, S. Roquemore, and E. Saxon. 2011. The root of the problem: What's driving deforestation today? Union of Concerned Scientists. Accessed: October 2012.
- ❖ Busch, J., Ferretti-Gallon, K., Engelmann, J., Wright, M., Austin, K. G., Stolle, F. & Baccini, A. 2015. Reductions in emissions from deforestation from Indonesia's moratorium on new oil palm, timber, and logging concessions. *Proceedings of the National Academy of Sciences*, 201412514.
- ❖ Butler, R. A. 2013. Malaysia has the world's highest deforestation rate, reveals Google forest map.
- ❖ CIA. 2014. Indonesia. <https://www.cia.gov/library/publications/the-world-factbook/geos/id.html>
- ❖ Conserve Energy Future. 2015. Deforestation: Compromises of a Growing World.
- ❖ FAO (Food and Agriculture Organization of the United Nations). 2010. FRA 2000: Pan-tropical survey of forest cover changes 1980-2000. FRA Working Paper No. 49. [www.fao.org/forestry/fo/fra/index.jsp](http://www.fao.org/forestry/fo/fra/index.jsp).
- ❖ FAO (Food and Agriculture Organization of the United Nations). 2007. Tropical Deforestation by Country and Region. Food and Agriculture Organization of the U.N.: The State of the World's Forests 2007. [http://www.mongabay.com/deforestation\\_rate\\_tables.htm](http://www.mongabay.com/deforestation_rate_tables.htm).
- ❖ FAO (Food and Agriculture Organization of the United Nations). 1995. State of the World's Forests. <http://www.fao.org/docrep/003/x6953e/X6953E00.htm#TOC>
- ❖ France-Presse, A. 2013. Indonesia Extends Logging Ban to Protect Rainforest", in *The Jakarta Globe*. 15 May 2013.

# References


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- ❖ Forest Watch Indonesia. 2014. The Unending Disintegration of Indonesia's Forests.
- ❖ Greenpeace. 2014. Solutions for Deforestation. <http://www.greenpeace.org/usa/en/campaigns/forests/solutions-to-deforestation/>
- ❖ Hensel, W. 1980. Polska starożytna. Wyd. 2, Ossolineum, Wrocław, Warszawa, Kraków, Gdańsk. 640 pp
- ❖ International Monetary Fund (IMF). 2014. World Economic Outlook, April 2014, p.160-163. Retrieved 2014-05-21.
- ❖ Jess and Madey. 2013. Forests. Wikispaces. <https://sic-9-indo.wikispaces.com/Jess+%26+Maddi>
- ❖ Kricher, J. (1997). A Neotropical Companion: An introduction to the animals, plants, & ecosystems of the New World Tropics. New Jersey: Princeton University Press.
- ❖ Lee, J.S.H., S. Abood, J. Ghazoul, B. Barus, K. Obidzinski and L. P. Koh. 2014. Environmental Impacts of Large-Scale Oil Palm Enterprises Exceed that of Smallholdings in Indonesia. *Conservation Letters*. Vol. 7, Issue 1, pages 25–33.
- ❖ Margono, B. A., S. Turubanova, I. Zhuravleva, P. Potapov, A. Tyukavina, A. Baccini, S. Goetz and M.C. Hansen. 2012. Mapping and monitoring deforestation and forest degradation in Sumatra (Indonesia) using Landsat time series data sets from 1990 to 2010. *Environ. Res. Lett.* 7 (No.3).
- ❖ National Geographic. <http://www.nationalgeographic.com/eye/deforestation/effect.html>
- ❖ SAF. 2008. SAF net Dictionary Definition For deforestation. Dictionary of forestry.org (2008-07-29). Retrieved on 2011-05-15.
- ❖ Satayamas, V. and A. Kawtrakul. 2004. WideCoverage Grammar Extraction from Thai Treebank. In Proceedings of Papillon 2004 Workshops on Multilingual Lexical Databases, Grenoble, France.



# References

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- ❖ Scholz, I. and L. Schmidt. 2008. Reducing Emissions from Deforestation and Forest Degradation in Developing Countries: Meeting the main challenges ahead .
  - ❖ Sullivan, A. and S. M. Sheffrin (2003). *Economics: Principles in Action*. Upper Saddle River, New Jersey 07458: Pearson Prentice Hall. p. 471.
  - ❖ Szalay, J. 2013. Deforestation: Facts, Causes & Effects. LiveScience Contributor.
  - ❖ The Prince's Rainforest Project. 2012. Drivers of Deforestation. Accessed: October 2012.
  - ❖ The World Bank
  - ❖ The World Bank. 2013. Europe & Central Asia (developing only) | Data. Data.worldbank.org.
  - ❖ Tree Bank Thai. <http://www.treebankthai.com/>
  - ❖ UCS (Union of Concerned Scientists). 2013. Palm Oil and Global Warming.
  - ❖ Wilson., E. O. 2002. *The Future of Life*, Vintage. ISBN 0-679-76811-4.
  - ❖ World Wide Fund for Nature (WWF)
  - ❖ WRI (World Resources Institute). 2010. Climate Analysis Indicators Tool (CAIT).
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[http://kids.mongabay.com/lesson\\_plans/lisa\\_algee/deforestation.html](http://kids.mongabay.com/lesson_plans/lisa_algee/deforestation.html)

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<http://map.vbgood.com/Indonesiamap.jpg>

<https://tobaexplorer.files.wordpress.com/2012/05/toba-explorer-ii-map-of-indonesia-world.jpg>

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<http://math.ucr.edu/home/baez/diary/extent-of-deforestation-in-borneo-1950-2005-and-projection-towards-2020.png>

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<http://mostlymovies.spddo.net/OoziesAndElephants/include/images/Pulling%20log.jpg>

<http://www.cifor.org/forestsasia/wp-content/uploads/2014/03/Jungle-People-and-NTFP.jpg>

<http://blogs.r.ftdata.co.uk/photo-diary/files/2013/08/PB2090657.jpg>

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[http://www.sustainablepalmoil.org/files/2012/09/RSPO\\_Trademark\\_Logo.png](http://www.sustainablepalmoil.org/files/2012/09/RSPO_Trademark_Logo.png)

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# **Acknowledgement**

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# Questions?

**Deforestation kills more than trees**



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