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## I. IN THE PRESS

16 April 2013 - CIFOR

[The Economist says we can simply adapt to climate change. We think they are mistaken](#)

A recent article in The Economist magazine asserted that the air temperature of the planet has been flat for the past 15 years despite a steady increase in the greenhouse gas concentration of the atmosphere. The authors find the lack of warming surprising, given the large volume of greenhouse gases that were pumped into the atmosphere between 2000 and 2010.

11 April 2013 - RECOFTC

[Building Rural-Urban and Cross-generational Bridges to Discuss Climate Change, Forests, and REDD+](#)

During a recent visit to Lao PDR, I had the opportunity to participate in a grassroots level awareness raising event initiated by RECOFTC's Grassroots Capacity Building for REDD+ project and conducted by the Lao civil society organization PADETC (Participatory Development Training Centre).

9 April 2013 - UN News Centre

[New UN-backed monitoring tool aims to help combat deforestation](#)

A new initiative unveiled today at the United Nations Forum on Forests will provide clear and timely information that makes it easier for governments, companies and communities to fight deforestation. Global Forest Watch 2.0 is an independent, interactive, real-time, forest monitoring system that unites satellite technology, data sharing and human networks around the world to provide information critical to better managing forests.

9 April 2013 - IISD

[UNFF10 High-Level Roundtables Focus on SDGs, Enhanced Collaboration](#)

High-level roundtable discussions at the tenth session of the UN Forum on Forests (UNFF10) have considered linkages between forests and economic development, as well as forests in the UN Conference on Sustainable Development (UNCSD, or Rio+20) outcomes and the post-2015 development agenda.

9 April 2013 - IISD

[Collaborative Partnership on forests Reports to UNFF10](#)

On the second day of the tenth session of the UN Forum on Forests (UNFF10), a high-level interactive dialogue with the Heads of the Collaborative Partnership on Forests (CPF) member organizations discussed CPF's achievements over the past two years. CPF Chair and the Food and Agriculture Organization of the UN (FAO) Forestry Assistant Director-General, Eduardo Rojas-Briales, led the presentation.

8 April 2013 - The Guardian

[Eight steps to climate-proof development in Africa](#)

Observational records and model projections clearly shows that 75-250 million people in Africa are projected to face increased water stress by 2020 due to climate change; the average sea level is expected to rise by about 50 cm by 2100 and about 70 million people in Africa's coastal areas could face the risk of flooding by 2080. It is estimated that by 2100, parts of the Sahara are likely to become the most vulnerable, showing likely agricultural losses of between 2 and 7% of GDP and by 2050 average rice, wheat, and maize yields will decline by up to 14%, 22%, and 5%, respectively.

2 April 2013 - UNESCO

[Mitigating climate change through coastal ecosystem management](#)

Curbing climate change means both removing carbon from the atmosphere and oceans and avoiding new carbon emissions. Total carbon deposits per square kilometer in these coastal systems may be up to five times the carbon stored in tropical forests, due to their ability to absorb, or sequester, carbon at rates up to 50 times those of the same area of tropical forest. However, these Blue Carbon ecosystems are being degraded and destroyed at a rapid pace. Major threats to these ecosystems include pollution, unsustainable coastal development and aquaculture. When these ecosystems are destroyed, their capacity to sequester carbon is lost and the stored carbon is released into the ocean and atmosphere, contributing to global climate change.

30 March 2013 - The Economist

[A sensitive matter](#)

The climate may be heating up less in response to greenhouse-gas emissions than was once thought. But that does not mean the problem is going away.

## II. MULTILATERAL PROCESSES IN CLIMATE CHANGE

The next scheduled UNFCCC negotiations will take place from 3-14 June, Bonn, Germany.

## III. EVENTS & MEETINGS

### Current events

#### **UNFF 10<sup>th</sup> session**

The United Nations Forum on Forests 10<sup>th</sup> session is taking place in Istanbul, Turkey from the 8 - 19 April. [More](#)

### Upcoming events

#### **International Conference on Forests for Food Security and Nutrition**

*13-15 May, Rome, Italy*

The International Conference on Forests for Food Security and Nutrition will increase understanding of the crucial role that forests, trees on farms and agroforestry systems can play in improving the food security and nutrition of rural people, especially in developing countries. It will propose ways to integrate this knowledge in policy decisions at the national and international levels. The conference objectives are to:

- i) highlight the ways in which forests, trees on farms and agroforestry systems contribute to food security and nutrition
- ii) explore policy options and innovative approaches for increasing the role of forests, trees on farms and agroforestry systems in food security and nutrition
- iii) identify key challenges and bottlenecks hindering that contribution

For more [details](#)

#### **International Conference on Climate Change and Tree Responses in Central European Forests**

*1-5 September 2013, Zürich, Switzerland*

The conference aims at exchanging the state of the art regarding direct (physical environment) and indirect effects (interspecific interactions) of climate change on the performance of trees and forest ecosystems. Topics to be discussed stretch from tree physiology and genetics to disturbances and community diversity, with a clear regional focus on Central Europe including the Alps and Carpathians. Keynotes on the response of trees/forest ecosystems to Climate Change (CC) in the focal region and in other regions of the world will frame the sessions, which are open for contributed talks. [More](#)

#### **Forests Africa. Opportunities for a Green Economy**

*17 - 19 September, Nairobi, Kenya.*

The United Nations Environment Programme (UNEP) and the Center for International Forestry Research (CIFOR) will convene a three-day conference, Forests Africa: Opportunities for a Green Economy. The conference will be supported by the UN-REDD Programme, the World Agroforestry Center and will be open for partnerships with other organizations. The event will provide a platform for key players from government, the private sector (formal and informal), civil society, media, as well as the research and development sectors, to openly discuss the challenges and opportunities that Africa's forests present for the development and comparative advantage of the continent and its transition to a Green Economy. The conference will aim to take a step toward repositioning forests within Africa's economic and political landscape. In transitioning to a Green Economy, Africa will require economic growth pathways that are diversified, generate greater employment, produce higher outputs with lower inputs, reduce environmental risks and enhance competitiveness for African economies. The conference will increase awareness of the challenges and opportunities for forests to contribute to green economies at the local, national and regional levels through sustainable management, REDD+, trade of forest products and services, and inclusive processes. It will also identify the range of enabling policies required. Delivering on such a goal will require coordinated collaboration among a broad range of policy and non-state stakeholders - especially those from outside the forestry sector. [More](#)

#### **EFI 20 Years Science and Policy Forum**

*23 - 27 September, 2013, Nancy, France*

European Forest Institute (EFI) celebrates its 20th anniversary in 2013. The commemoration is also an opportunity to develop an analysis of the future of our forests, and on how EFI and its partners can contribute to meet the challenges related to the various changes, risks and uncertainties to which the forests will be exposed. The EFI 20 Years Science and Policy Forum will stimulate balanced discussion between policy/decision makers, stakeholders and scientists on concrete issues related to the future of our forests, and the risks and opportunities they face. On 25 September, a high-level conference “Our forests in the 21<sup>st</sup> century - ready for risks and opportunities?” gathers both scientists and decision-makers. The follow-up of the conference on 26 September continues with a session “Risks to European Forests - What added value can a European Forest Risk Facility provide?” [More](#)

## IV. RESEARCH ARTICLES

### Homegardens as a Multi-functional Land-Use Strategy in Sri Lanka with Focus on Carbon Sequestration

Mattsson, E., Ostwald, M., Nissanka, S.P., Marambe, B.

*Ambio*. DOI 10.1007/s13280-013-0390-x

This paper explores the concept of homegardens and their potential functions as strategic elements in land-use planning, and adaptation and mitigation to climate change in Sri Lanka. The ancient and locally adapted agroforestry system of homegardens is presently estimated to occupy nearly 15 % of the land area in Sri Lanka and is described in the scientific literature to offer several ecosystem services to its users; such as climate regulation, protection against natural hazards, enhanced land productivity and biological diversity, increased crop diversity and food security for rural poor and hence reduced vulnerability to climate change. Our results, based on a limited sample size, indicate that the homegardens also store significant amount of carbon, with above ground biomass carbon stocks in dry zone homegardens (n = 8) ranging from 10 to 55 megagrams of carbon per hectare (Mg C ha<sup>-1</sup>) with a mean value of 35 Mg C ha<sup>-1</sup>, whereas carbon stocks in wet zone homegardens (n = 4) range from 48 to 145 Mg C ha<sup>-1</sup> with a mean value of 87 Mg C ha<sup>-1</sup>. This implies that homegardens may contain a significant fraction of the total above ground biomass carbon stock in the terrestrial system in Sri Lanka, and from our estimates its share has increased from almost one-sixth in 1992 to nearly one-fifth in 2010. In the light of current discussions on reducing emissions from deforestation and forest degradation (REDD+), the concept of homegardens in Sri Lanka provides interesting aspects to the debate and future research in terms of forest definitions, setting reference levels, and general sustainability.

### Attribution of CO<sub>2</sub> emissions from Brazilian deforestation to consumers between 1990 and 2010

Karstensen, J., Peters, G.P., Andrew, R.M

*Environmental Research Letters*. Vol 8. 024005 doi:10.1088/1748-9326/8/2/024005

Efforts to reduce deforestation to mitigate climate change and to conserve biodiversity are taking place on a global scale. While many studies have estimated the emissions occurring from deforestation, few studies have quantified the domestic and international drivers sustaining deforestation rates. In this study we establish the link between Brazilian deforestation and production of cattle and soybeans, and allocate emissions between 1990 and 2010 along the global supply chain to the countries that consume products dependent on Brazilian deforestation. We find that 30% of the carbon emissions associated with deforestation were exported from Brazil in the last decade, of which 29% were due to soybean production and 71% cattle ranching. The share exported is growing, with industrialized nations and emerging markets (especially Russia and China) greatly increasing imports. We find a correlation between exports (and hence global consumption) of Brazilian cattle and soybeans and emissions from deforestation. We conclude that trade is emerging as a key driver of deforestation in Brazil, and this may indirectly contribute to loss of the forests that industrialized countries are seeking to protect through international agreements.

### Conservation planning under climate change: accounting for adaptive potential and migration capacity in species distribution models

Hamann, A.; Aitken, S. N.;

*Diversity and Distributions*; 2013. 19: 3, 268-280

Aim: A number of assumptions underpinning the use of species distribution models to predict biological responses to climate change are violated for temperate and boreal tree species that are widespread, long-lived and genetically adapted to local climate conditions. To address this situation, we propose a methodology to account for the potential effects of genetic structure, adaptive potential and limited migration capacity. Location: British Columbia, Canada. Methods: Similar to the widely used 'no migration' and 'unlimited migration' scenarios, we employ more refined biological response scenarios to evaluate the potential effects of genetic

adaptation to local environments and the capacity of species to adapt and migrate. These scenarios are realized by two sets of geographic delineations that partition the species range into multiple populations and that subdivide the study area into smaller landscape units. Results: In a case study for British Columbia, we demonstrate how the approach can be used to evaluate the adequacy of a reserve system of 906 protected areas to ensure long-term maintenance of forest genetic resources for 48 tree species. We find that between 35% and 85% of locally adapted populations in protected areas are maintained under a median climate change scenario until the end of the century. A sensitivity analysis shows that assumptions about migration and adaptation capacity of species have a major effect on the projected conservation status. Main conclusions: We propose that the results of species distribution models have practical value for conservation planning if the focus is on maintenance rather than loss of suitable habitat. Accounting for genetic structure, adaptive potential and migration capacity through best-case and worst-case scenarios provide important information to effectively allocate limited resources available for conservation action.

### **Carbon emissions in Mediterranean shrubland wildfires: an experimental approach**

Garcia-Hurtado, E.; Pey, J.; Baeza, M. J.; Carrara, A.; Llovet, J.; Querol, X.; Alastuey, A.; Vallejo, V.R

*Atmospheric Environment*; 2013. 69: 86-93

Forest fire emissions modify the chemical composition of the atmosphere and the earth's climate system. The Ayoraburning experiment was designed to assess and quantify fire emissions from Mediterranean shrublands. A number of gaseous pollutants and particulate matter metrics (CO<sub>2</sub>, CO, CH<sub>4</sub>, PM<sub>2.5</sub>) were measured during 3 burning replicates by using real-time monitors. Quantification of carbon emissions released during the experiments showed that 71% was CO<sub>2</sub>, 26% CO, 3% CH<sub>4</sub>, and only 0.3% was particulate carbon. Emission factors obtained for CO<sub>2</sub>, CO and CH<sub>4</sub> were 1257±40, 453±28 and 46±12 g kg<sup>-1</sup> dry matter, respectively, and combustion efficiencies ranged from 0.46 to 0.99. The experiments allowed the estimation of carbon emission in the different fire phases. Thus, 25% of carbon was sampled in the flaming phase and 75% of C in the smoldering phase. Current natural greenhouse gas (GHG) emission inventories in Mediterranean countries underestimate the actual emissions from forest fires since they do not consider forest shrub understory and shrublands and since they assume that the CO<sub>2</sub> emitted is offset by forest re-growth. Our results may be used to improve current forest-fire emission inventories in southern Europe with special emphasis on shrublands

### **Mapping changes in the largest continuous Amazonian mangrove belt using object-based classification of multisensor satellite imagery**

Nascimento, W. R., Jr.; Souza Filho, P. W. M.; Proisy, C.; Lucas, R. M.; Rosenqvist, A.

*Estuarine, Coastal and Shelf Science*; 2013. 117: 83-93

Mapping and monitoring mangrove ecosystems is a crucial objective for tropical countries, particularly where human disturbance occurs and because of uncertainties associated with sea level and climatic fluctuation. In many tropical regions, such efforts have focused largely on the use of optical data despite low capture rates because of persistent cloud cover. Recognizing the ability of Synthetic Aperture Radar (SAR) for providing cloud-free observations, this study investigated the use of JERS-1 SAR and ALOS PALSAR data, acquired in 1996 and 2008 respectively, for mapping the extent of mangroves along the Brazilian coastline, from east of the Amazon River mouth, Para State, to the Bay of Sao Jose in Maranhao. For each year, an object-oriented classification of major land covers (mangrove, secondary vegetation, gallery and swamp forest, open water, intermittent lakes and bare areas) was performed with the resulting maps then compared to quantify change. Comparison with available ground truth data indicated a general accuracy in the 2008 image classification of all land covers of 96% (kappa=90.6%, tau=92.6%). Over the 12 year period, the area of mangrove increased by 718.6 km<sup>2</sup> from 6705 m<sup>2</sup> to 7423.60 km<sup>2</sup>, with 1931.0 km<sup>2</sup> of expansion and 1213 km<sup>2</sup> of erosion noted; 5493 km<sup>2</sup> remained unchanged in extent. The general accuracy relating to changes in mangroves was 83.3% (Kappa 66.1%; tau 66.7%). The study confirmed that these mangroves constituted the largest continuous belt globally and were experiencing significant change because of the dynamic coastal environment and the influence of sedimentation from the Amazon River along the shoreline. The study recommends continued observations using combinations of SAR and optical data to establish trends in mangrove distributions and implications for provision of ecosystem services (e.g., fish/invertebrate nurseries, carbon storage and coastal protection).

### **Comparison of carbon sequestration quantity in *Haloxylon aphyllum* and *Stipagrostis plumosa* in Iran Desert Area**

Kareh, H. A.; Naseri, H. R.; Heshmati, G. H. A

*World Applied Sciences Journal*; 2013. 21: 8, 1190-1193.

Carbon sequestration in soil organic matter (SOM) is increasingly advocated as a potential win-win strategy for reclaiming degraded lands, particularly in arid regions of the developing world, mitigating global climate change and improving the livelihoods of resource-poor farmers. Vegetation management to develop the shrub

or tree species in arid and semi-arid regions is one of the inexpensive and multi-purpose methods to decrease CO<sub>2</sub>. Afforestation in desert regions is one of the most practical and advantageous methods of desert management. This research was done in Saxaul (*Haloxylon aphyllum*) stands as the afforested area and the surrounding native vegetation *Stipagrostis plumosa* (Control area) in Aran-o-Bidgol desert of Iran. In both areas, the amounts of aboveground and underground biomass of the species were calculated by cutting and weighting the aerial parts (leaves, stem) and roots in both species. Ash method was used to determine carbon sequestration coefficient of the studied species. The amounts of soil carbon sequestration were measured too by using of wacky black method. The comparison of carbon sequestration of *H. aphyllum* in the unit of the measuring surface and control areas (*S. plumosa* biomass) showed the difference of this ability between two areas ( $p < 0.01$ ). The results indicated that total soil carbon sequestration of *H. aphyllum* (24.31 mg/ha) was significantly ( $p < 0.01$ ) more than *S. plumosa* (11.2 mg/ha).

## **Assessing net carbon sequestration on urban and community forests of northern New England, USA**

Zheng, D. L.; Ducey, M. J.; Heath, L. S

*Urban Forestry & Urban Greening*; 2013. 12: 1, 61-68.

Urban and community forests play an important role in the overall carbon budget of the USA. Accurately quantifying carbon sequestration by these forests can provide insight for strategic planning to mitigate greenhouse gas effects on climate change. This study provides a new methodology to estimate net forest carbon sequestration (FCS) in urban and community lands of northern New England using ground based forest growth rates, housing density data, satellite derived land cover and tree canopy cover maps at the county level. We estimated that the region's urban and community forests sequestered 603,200 tC/yr (\$38.7 million/yr value), contributing 8.2% of regional net forest ecosystem carbon sequestration. The contributions at the state level varied from 2.3% in Vermont to 16.6% in New Hampshire with substantial variation at the county level up to 73.3%. Spatially, contribution rates from urban and community forests at the county level were much higher and concentrated in southeast portion of NH and southwest portion of ME along the coast, and decreased toward inland areas. Our estimated net FCS compared reasonably with gross FCS in the region reported by a previous study. On average, the net FCS was 34.2% lower (varying from 41.9% lower in Vermont to 28.1% lower in Maine) than the corresponding gross FCS mainly because of a lower regional average net growth rate used in this study, compared to the national average gross carbon sequestration rate used in the previous study.

## **Integrating national forestry initiatives in India with international climate change policy**

Khatun, K.

*Climate Policy*; 2013. 13: 3, 384-402

Policy initiatives in India, such as the Social Forestry Program and later the Joint Forest Management, were introduced for their co-benefits, including forest protection, employment opportunities, and added income for communities living in and around the forests. The evolution of these forest policies is critically reviewed. It is argued that India is perfectly positioned to benefit from climate change mitigation efforts, due to a rich, albeit chequered, history in forest management. National forestry policies are examined to assess how they can complement international climate change mitigation instruments, such as the Clean Development Mechanism (CDM) and the more recent Reduced Emissions from Deforestation and Forest Degradation (REDD or REDD+ with conservation, sustainable management of forests, and enhancement of forest carbon stocks) and aid national sustainable development objectives. There is a need to heed the experiences from India's evolving forest policies, particularly those concerning land tenure and resource rights, which lack specificity within international mechanisms. The active engagement of rural communities must be integral to any programmes that make any claim to development and to environmental integrity as a whole. Policy relevance. India's forestry programmes are examined for their effectiveness in informing international initiatives such as the CDM and REDD+. Forestry policies in India can evolve to complement international climate mitigation tools. By examining current and historical forest legislation, and their subsequent impacts, it is shown how communities can sustain their system of forest management and retain/obtain rights to land and resources under the CDM and REDD+. Looking for such synergies within existing national policies to implement newer international initiatives can greatly facilitate and increase the momentum of global environmental change.

## **Sensitivity of Russian forest timber harvest and carbon storage to temperature increase**

Lutz, D. A.; Shugart, H. H.; White, M. A.

*Forestry (Oxford)*; 2013. 86: 2, 283-293.

Russia is a leading exporter of industrial round wood and supplies many countries with a large share of their wood fibre. However, warming temperatures are likely to have an impact on the productivity of Russian forest stands and affect their production capacity and management. The forest gap model FAREAST was used to derive biological growth parameters of several forest types; these data were then used within an economic



model to discern the response from both a timber harvest and carbon sequestration perspective. An incremental warming of 2 degrees C resulted in an increase in the timber harvest for most forest types. A 4 degrees C increase, however, caused nearly all projects to yield less timber and sequester less carbon than under current conditions. Only stands in northwestern Russia stocked with *Pinus sylvestris*, a fast growing heat-tolerant species, continuously increased timber harvest and carbon sequestration in parallel with extreme temperature changes; however, stands with greater species diversity were less sensitive to increased temperatures. Russian forest carbon sequestration, a process mentioned as a method to mitigate climate change, may become less effective by the same process it is hoped to assuage.

### **Using basal area to estimate aboveground carbon stocks in forests: La Primavera Biosphere's Reserve, Mexico**

Torres, A. B.; Lovett, J. C.

*Forestry (Oxford)*; 2013. 86: 2, 267-281

Increasing use of woody plants for greenhouse gas mitigation has led to demand for rapid, cost-effective estimation of forest carbon stocks. Bole diameter is readily measured and basal area can be correlated to biomass and carbon through application of allometric equations. We explore different forms of allometric equations and analyse the potential to use of equations for individual trees to derive stand-level equations, where the basal area and the average diameter are used as explanatory variables. To test the relationships derived from published allometric equations, we used data from a forest inventory in the oak-pine forests in La Primavera (Mexico). Results show that in two forests with the same species and basal area, there will be more carbon where trees are larger. Allometric equations for individual trees can be transformed into stand-level equations. The values of average diameter weighted by the basal area for these equations can be based on a small sample of large trees once the local relationship between tree size and tree density per hectare is known. This approach could considerably reduce field data requirements in comparison with inventory methods based on enumeration of all trees for estimation of biomass and carbon.

### **Carbon sequestration potential of post-mining reforestation activities on the KwaZulu-Natal coast, South Africa**

Rooyen, M. W. van; Rooyen, N. van; Stoffberg, G. H

*Forestry (Oxford)*; 2013. 86: 2, 211-223

Restoration of former mined land can potentially capture large quantities of atmospheric carbon dioxide if appropriate reclamation techniques and post-reclamation management strategies are applied. The objectives of the current study were: to quantify carbon stocks in five pools; to develop empirical relationships between stand age and carbon stocks; to compare the carbon sequestration potential of rehabilitated land under different land uses and to recommend management practices to maximize carbon sequestration. The carbon stocks in five pools (aboveground, belowground, litter, debris and soil), of the rehabilitated vegetation were quantified. For this purpose, 18 sites were selected including both commercial plantations and rehabilitated indigenous forests. The relationship between total, aboveground and belowground carbon stocks in the *Casuarina equisetifolia* plantation and stand age was sigmoidal, whereas the relationship was linear for the rehabilitating indigenous forest. The rehabilitated indigenous forest exceeded the mean net carbon storage of *C. equisetifolia* plantations after ~19 years. Maximum carbon accumulation in the rehabilitated indigenous forest compared well with values reported for reclaimed ecosystems in the USA and Europe. Carbon sequestration potential of the mined land could be optimized and natural capital restored through reforestation of harvested *C. equisetifolia* plantations with indigenous forest.

### **The Global Forest Observations Initiative: fostering the use of satellite data in forest measurement, reporting and verification**

Baltuck, M.; Briggs, S.; Loyche-Wilkie, M.; McGee, A.; Muchoney, D.; Skrovseth, P. E

*Carbon Management*; 2013. 4: 1, 17-21

Multilateral organization incentives and emerging carbon credit markets could benefit national governments, which can demonstrate reduction of emissions from deforestation and forest degradation. Such demonstration requires a credible national forest monitoring system. The Global Forest Observations Initiative was developed to foster the sustained availability of satellite Earth observations for national forest monitoring systems and assist countries to make the best use of these observations in multinational framework reporting or for improved management of their natural resources.

### **Epigenetic regulation of adaptive responses of forest tree species to the environment**

Brautigam, K.; Vining, K. J.; Lafon-Placette, C.; Fossdal, C. G.; Mirouze, M.; Marcos, J. G.; Fluch, S.;



Fernandez Fraga, M.; Angeles Guevara, M.; Abarca, D.; Johnsen, O.; Maury, S.; Strauss, S. H.; Campbell, M. M.; Rohde, A.; Diaz-Sala, C.; Cervera, M. T.;

*Ecology and Evolution*; 2013. 3: 2, 399-415

Epigenetic variation is likely to contribute to the phenotypic plasticity and adaptive capacity of plant species, and may be especially important for long-lived organisms with complex life cycles, including forest trees. Diverse environmental stresses and hybridization/polyploidization events can create reversible heritable epigenetic marks that can be transmitted to subsequent generations as a form of molecular "memory". Epigenetic changes might also contribute to the ability of plants to colonize or persist in variable environments. In this review, we provide an overview of recent data on epigenetic mechanisms involved in developmental processes and responses to environmental cues in plants, with a focus on forest tree species. We consider the possible role of forest tree epigenetics as a new source of adaptive traits in plant breeding, biotechnology, and ecosystem conservation under rapid climate change. This paper reviews the role of epigenetics in development and adaptability of forest trees. Forest trees are long-lived, sessile organisms that must continuously adjust their responses to prevailing conditions to cope with a changing environment. Epigenetic variation is likely to be a key factor contributing to phenotypic plasticity, by modulating stress capacity to adjust to variable environments. This capability is clearly relevant to coping with climate change.

### **Evaluation and improvement of the Community Land Model (CLM4) in Oregon forests.**

Hudiburg, T. W.; Law, B. E.; Thornton, P. E

*Biogeosciences*; 2013. 10: 1, 453-470

Ecosystem process models are important tools for determining the interactive effects of global change and disturbance on forest carbon dynamics. Here we evaluated and improved terrestrial carbon cycling simulated by the *Community Land Model (CLM4)*, the land model portion of the Community Earth System Model (CESM1.0.4). Our analysis was conducted primarily in Oregon forests using FLUXNET and forest inventory data for the period 2001-2006. We go beyond prior modeling studies in the region by incorporating regional variation in physiological parameters from >100 independent field sites in the region. We also compare spatial patterns of simulated forest carbon stocks and net primary production (NPP) at 15 km resolution using data collected from federal forest inventory plots (FIA) from >3000 plots in the study region. Finally, we evaluate simulated gross primary production (GPP) with FLUXNET eddy covariance tower data at wet and dry sites in the region. We improved model estimates by making modifications to CLM4 to allow physiological parameters (e.g., foliage carbon to nitrogen ratios and specific leaf area), mortality rate, biological nitrogen fixation, and wood allocation to vary spatially by plant functional type (PFT) within an ecoregion based on field plot data in the region. Prior to modifications, default parameters resulted in underestimation of stem biomass in all forested ecoregions except the Blue Mountains and annual NPP was both over- and underestimated. After modifications, model estimates of mean NPP fell within the observed range of uncertainty in all ecoregions (two-sided  $P$  value=0.8), and the underestimation of stem biomass was reduced. This was an improvement from the default configuration by 50% for stem biomass and 30% for NPP. At the tower sites, modeled monthly GPP fell within the observed range of uncertainty at both sites for the majority of the year, however summer GPP was underestimated at the Metolius semi-arid pine site and spring GPP was overestimated at the Campbell River mesic Douglas-fir site, indicating GPP may be an area for further improvement. The low bias in summer maximum GPP at the semi-arid site could be due to seasonal response of  $V_{cmax}$  to temperature and precipitation while overestimated spring values at the mesic site could be due to response of  $V_{cmax}$  to temperature and day length.

### **A study of forest biomass estimates from lidar in the northern temperate forests of New England**

Ahmed, R.; Siqueira, P.; Hensley, S

*Remote Sensing of Environment*; 2013. 130: 121-135

Quantification of global carbon storage, carbon flux and disturbance in forested regions is of critical importance to refining our understanding of ecosystem processes, climate modeling and climate change. Remote sensing instruments, such as lidar and radar provide a means of obtaining highly accurate and well resolved biomass estimates over global scales. This has sparked interest in mission concepts such as DESDynI. One of the core objectives of the proposed DESDynI mission was global carbon accounting and monitoring through a combination of lidar and radar measurements. In this article, the relationship between field biomass and lidar metrics is analyzed using data from coordinated field measurements and lidar overflights at the Harvard and Howland Forests in North-Eastern United States to assess the performance of a potential biomass mapping instrument. Results show that the performance of lidar estimates of biomass vary significantly between the two sites even though they belong to the same northern temperate forest ecoregion. An attempt is made to isolate the reasons behind the dissimilarities. While RMS errors as low as 30 tons/ha can be seen, these are limited to biomass ranges of up to 300 tons/ha.

## **Natural carbon capture and storage (NCCS): forests, land use and carbon accounting**

Cunha-e-Sa, M. A.; Rosa, R.; Costa-Duarte, C

*Resource and Energy Economics*; 2013. 35: 2, 148-170

The use of forests as natural carbon capture and storage sinks is considered by introducing carbon sequestration benefits' accounting in a multi-vintage partial equilibrium land-use model, under different carbon price scenarios. The consequences to timber and land markets and to the profile of the carbon sequestration time path are examined in the short-run, long-run, and transition. Following IPCC, three carbon accounting methods are considered: the carbon flow, the ton-year crediting and the average storage. A full proof of long-run optimality of steady-state forest is provided. Numerical simulations are performed and results discussed illustrating the setup's potential.

## **A system dynamic modeling of carbon cycle from mangrove litter to the adjacent Hooghly estuary, India**

Joyita Mukherjee; Santanu Ray; Ghosh, P. B.;

*Ecological Modelling*; 2013. 252: 185-195

Hooghly-Matla estuarine system receives a major load of carbon from adjacent mangrove forest in the form of litterfall throughout the year. Keeping in view, the crucial role of carbon, a seven compartment model has been proposed to study the dynamics of carbon in this estuarine system. Different forms of carbon present in soil (as soil organic carbon (SOC), soil inorganic carbon (SIC)) and in water (as dissolved inorganic carbon (DIC), dissolved carbon dioxide (DCO<sub>2</sub>), dissolved bicarbonate (DBC), dissolved organic carbon (DOC) and particulate organic carbon (POC)) are taken as state variables. Litter biomass, dissolved oxygen, primary productivity, community respiration, temperature of water, pH of water and soil, air-water exchange of carbon dioxide and conversion rates among different forms of carbon are considered as graph time functions. The data used in the present model are collected for over two years from our own field works and experiments. Other sensitive rate parameters which are not possible to collect from survey or experiment, calibrated following standard procedure. Sensitivity analysis is performed along with calibration. Model simulation results are validated with observed data. Results show seasonal variations of litterfall and which is the main source of SOC pool and ultimately transported to the estuary. Other than litterfall, the death of organisms in soil and water enriches the SOC and POC respectively. pH of water is governing factor and depending on this factor, DIC is converted to DCO<sub>2</sub> and DBC, which are taken up by phytoplankton during photosynthesis. Mineralization rate of SOC to SIC and uptake rate of DCO<sub>2</sub> and DBC are the sensitive parameters.

## **National forest cover change in Congo Basin: deforestation, reforestation, degradation and regeneration for the years 1990, 2000 and 2005**

Celine, E.; Philippe, M.; Astrid, V.; Catherine, B.; Musampa, C.; Pierre, D

*Global Change Biology*; 2013. 19: 4, 1173-1187

This research refers to an object-based automatic method combined with a national expert validation to produce regional and national forest cover change statistics over Congo Basin. A total of 547 sampling sites systematically distributed over the whole humid forest domain are required to cover the six Central African countries containing tropical moist forest. High resolution imagery is used to accurately estimate not only deforestation and reforestation but also degradation and regeneration. The overall method consists of four steps: (i) image automatic preprocessing and preinterpretation, (ii) interpretation by national expert, (iii) statistic computation and (iv) accuracy assessment. The annual rate of net deforestation in Congo Basin is estimated to 0.09% between 1990 and 2000 and of net degradation to 0.05%. Between 2000 and 2005, this unique exercise estimates annual net deforestation to 0.17% and annual net degradation to 0.09%. An accuracy assessment reveals that 92.7% of tree cover (TC) classes agree with independent expert interpretation. In the discussion, we underline the direct causes and the drivers of deforestation. Population density, small-scale agriculture, fuelwood collection and forest's accessibility are closely linked to deforestation, whereas timber extraction has no major impact on the reduction in the canopy cover. The analysis also shows the efficiency of protected areas to reduce deforestation. These results are expected to contribute to the discussion on the reduction in CO<sub>2</sub> emissions from deforestation and forest degradation (REDD+) and serve as reference for the period.

## **Tracking suitable habitat for tree populations under climate change in western North America**

Gray, L. K.; Hamann, A

*Climatic Change*; 2013. 117: 1/2, 289-303.

An important criticism of bioclimate envelope models is that many wide-ranging species consist of locally adapted populations that may all lag behind their optimal climate habitat under climate change, and thus should be modeled separately. Here, we apply a bioclimate envelope model that tracks habitat of individual populations to estimate adaptational lags for 15 wide-ranging forest tree species in western North America. An

ensemble classifier modeling approach (RandomForest) was used to spatially project the climate space of tree populations under observed climate trends (1970s to 2000s) and multi-model projections for the 2020s, 2050s and 2080s. We find that, on average, populations already lag behind their optimal climate niche by approximately 130 km in latitude, or 60 m in elevation. For the 2020s we expect an average lag of approximately 310 km in latitude or 140 m in elevation, with the most pronounced geographic lags in the Rocky Mountains and the boreal forest. We show that our results could in principle be applied to guide assisted migration of planting stock in reforestation programs using a general formula where 100 km north shift is equivalent to approximately 44 m upward shift in elevation. However, additional non-climatic factors should be considered when matching reforestation stock to suitable planting environments.

## **Sensitivity of carbon budget to historical climate variability and atmospheric CO<sub>2</sub> concentration in temperate grassland ecosystems in China**

Sui XingHua; Zhou GuangSheng; Zhuang, Q. L

*Climatic Change*; 2013. 117: 1/2, 259-272

Chinese temperate grasslands play an important role in the terrestrial carbon cycle. Based on the parameterization and validation of Terrestrial Ecosystem Model (TEM, Version 5.0), we analyzed the carbon budgets of Chinese temperate grasslands and their responses to historical atmospheric CO<sub>2</sub> concentration and climate variability during 1951-2007. The results indicated that Chinese temperate grassland acted as a slight carbon sink with annual mean value of 7.3 Tg C, ranging from -80.5 to 79.6 Tg C yr<sup>-1</sup>. Our sensitivity experiments further revealed that precipitation variability was the primary factor for decreasing carbon storage. CO<sub>2</sub> fertilization may increase the carbon storage (1.4%) but cannot offset the proportion caused by climate variability (-15.3%). Impacts of CO<sub>2</sub> concentration, temperature and precipitation variability on Chinese temperate grassland cannot be simply explained by the sum of the individual effects. Interactions among them increased total carbon storage of 56.6 Tg C which 14.2 Tg C was stored in vegetation and 42.4 Tg C was stored in soil. Besides, different grassland types had different responses to climate change and CO<sub>2</sub> concentration. NPP and R<sub>H</sub> of the desert and forest steppes were more sensitive to precipitation variability than temperature variability while the typical steppe responded to temperature variability more sensitively than the desert and forest steppes.

## **V. PUBLICATIONS, REPORTS AND OTHER MEDIA**

### **Compilation of information on nationally appropriate mitigation actions to be implemented by developing country Parties**

*UNFCCC*

This document presents a compilation of the information on all nationally appropriate mitigation actions (NAMAs) communicated by developing country Parties to date. The compilation comprises the NAMAs contained in documents FCCC/AWGLCA/2011/INF.1 and FCCC/AWGLCA/2012/MISC.2 and Add.1 and those communicated by four developing country Parties, which have not previously been included in an official UNFCCC document. The information communicated on NAMAs submitted in response to a Notification to Parties dated 18 January 2010 includes related context, conditions and considerations associated with the NAMAs, including with regard to the support required for their preparation and implementation. Information subsequently communicated includes information on underlying assumptions and methodologies, sectors and gases covered, global warming potential values used and estimated mitigation outcomes. [The publication](#)

### **At cross-purposes: subsidies and climate compatible investment**

*ODI*

There is widespread consensus that the private sector must be mobilised to support climate-compatible development (CCD). There is also broad acknowledgment, however, that we have only limited information and data on how best to achieve this goal. To date, the discourse on climate finance in general, and on private climate finance (PCF) in particular, has barely acknowledged the use of subsidies as tools to mobilise the private sector. This paper highlights the implications of the current separation of the discourses on PCF and on subsidies, and the opportunities that exist to unlock climate-compatible investment by linking these fields. Though climate finance aims to enable CCD, this paper points out that, within developing countries, subsidies to fossil fuels (alone) currently dwarf any efforts toward CCD through climate finance. [The publication](#)

### **Strategies for Combating Climate Change in Drylands Agriculture**

*ICARDA*

The aim of this report is to examine the problem of changing climate patterns in dry land areas and its effect

on rural populations and offer some practical solutions, as input the Conference of Conference of the Parties (COP18) United Nations Framework Convention on Climate Change (UNFCCC) It has been prepared to inform government policy makers and agricultural planners in dryland countries, and development partners, of the issues at stake and present options available to reducing risk and increasing productivity of agriculture in drylands agricultural systems. The information presented here comes from discussions at the International Conference on Food Security in Dry Lands, held in Doha, Qatar, on Nov 14-15, 2012. It is informed by the body of agricultural research produced by three authors of this report:

- CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)
- ICARDA - The International Center for Agricultural Research in the Dry Areas
- CGIAR Research Program on Dryland Systems

The Doha conference brought together a large number of dryland government ministers with researchers, policy makers, donors, NGOs, farmers' unions and private agribusiness enterprises to explore the challenge of increasing agricultural production in dry countries, under conditions of severe water scarcity and climate change. The ministers' recommendations, resulted in the Doha Declaration (see Annexe), which is taken forward on behalf of the Dry Lands to the 18<sup>th</sup> session of the Conference on Parties of the UN Conference of Parties of the Convention on Climate Change (COP 18), which opened in Doha in November 2012. [The publication](#)

## **Guidelines for formulating national forest financing strategies**

*FAO*

Forests provide fresh water, soil protection, carbon sequestration, and other valuable resources that forest-dependent communities have relied on for millennia. Quantifying these goods and services has been the focus of considerable attention in recent years. But even if we can agree on how much they are worth, how do we pay for such goods and services? Given that most of the forests in Asia and the Pacific region are state owned, mechanisms on ways to receive funds from outside national treasuries need to be sought taking account of the role of public institutions, the interests of local communities, payment for ecological services and promotion of private sector investment. This publication provides a set of guidelines for formulating national forest financing strategies to invigorate the forestry sector and enhance sustainable forest management. [The publication](#)

## **Small-Scale Illegal Logging in Vietnam: Implications for FLEGT and REDD+**

*Forest Trends*

This brief summarizes village case studies that demonstrate how Vietnam's domestic illegal logging will only be curtailed if Vietnamese policies promote forest governance that accommodates small-scale forest use and management, and allows local communities to benefit from the forest. Effective strategies to curb illegal logging will require the allocation of clear and secure tenure rights to local people in order to improve their ability to benefit from local forests. This is a key lesson to consider in the Forest Law Enforcement, Governance and Trade (FLEGT) and Reduced Emissions from Deforestation and Forest Degradation (REDD+) initiatives currently pursued by the Government of Vietnam. [The brief](#)

## **REDD+ in Vietnam: Integrating National and Subnational Approaches**

*Forest Trends Association and Climate Focus*

Despite the significant progress made to date on reducing emissions from deforestation and degradation (REDD+) it is still unclear how a future REDD+ mechanism may be implemented in practice, and in particular how to design REDD+ to deliver ecosystem conservation and restoration in an economically efficient and socially sustainable way. "Nested" approaches to REDD+ offer countries an opportunity to account for overall emission reductions and removals (ERRs) from REDD+ activities at the national level as well as at the level of nested subnational programs and/or projects within the national system. Although nesting can also add considerable complexity in carbon accounting, risk-sharing, and institutional arrangements, the advantages to nested approaches are seen to outweigh this increased complexity. This is true especially as the UNFCCC discussions focus increasingly on accounting and performance at national levels and away from project-level activities that have dominated voluntary carbon markets to date, and yet countries will benefit greatly by building on their project-level capacity. Applying the latest technical understanding on how to integrate national and subnational approaches to REDD+, this paper provides background information and preliminary advice to the Government of Vietnam and stakeholders on applying a nested REDD+ approach in Vietnam. [The publication](#)

## **Mainstreaming Climate Change into Community Development Strategies and Plans: A Case Study in Thailand**

*Asia Pacific Adaptation Network*

This case study in Lao-oi district demonstrates how climate change can be mainstreamed into a local community development plan. The case study explains how adaptation was incorporated into the plan to address risks and vulnerabilities associated with rice-farming, the main source of livelihood in the community. The findings reveal that a paradigm shift toward mainstreaming climate change into development planning, and away from addressing adaptation separately from development, has to occur at the level of sub-district administration for the success of adaptation measures. [The publication](#)

## **Combating Illegal Logging in Asia. A Review of Progress and the Role of the Asia Forest Partnership 2002-2012**

*Forest Trends*

Forests in Asia play a critical role in providing a variety of services that millions of people depend upon for their livelihoods and social stability. They also contain most of the Asia-Pacific region's terrestrial biodiversity. By the turn of the Millennium, the forests of the region, particularly in the tropics, were acknowledged to be in crisis. Deforestation and forest degradation were rising to unprecedented rates, often as a direct result of illegal activities. There was also a dawning recognition that illegal logging was not only an environment threat, but was also contributing to conflict, corruption, and disrespect for the rule of law. [The publication](#)

## **Towards the Assessment of Trees Outside Forests. A thematic report prepared in the framework of the Global Forest Resources Assessment 2010**

*FAO*

The concept of "Trees outside Forests" -TOF- emerged in 1995 to designate trees growing outside the forest and not belonging to Forest or Other Wooded Land. The term represents an effort to concentrate attention that had been spread out on components of this rather diffuse resource: agroforestry, silvopastoralism, urban and rural forestry, and other related disciplines. In policy and public discourse, these important resources were overlooked. The importance of Trees outside Forests for sustainable and integrated land management prompted the Expert Meeting on Global Forest Resources Assessments, held in 1996 in Kotka, Finland (Kotka III), to recommend that FAO and the FRA programme take steps to improve the data on this sector. In response, the TOF issue was included into the Global FRA 2000 process. An expert consultation on "enhancing the contribution of TOF to sustainable livelihoods", held in FAO-Rome (November 2001), produced various reports and publications, and the synthesis "Trees outside Forests: Towards better Awareness" (FAO conservation Guide 35, 2002). The FAO Forestry Department held regional training workshops such as the workshop on "Assessment of TOF" held in April 2002 in Dehradun, India, and the project on "the role of planted forests and trees outside forests in landscape restoration in low forest cover countries" (FAO 2004). [The publication](#)

## **FIP: REDD+ Stakeholder Collaboration**

*Climate Investment Funds*

The CIF Administrative Unit commissioned this Learning Product to record experiences and lessons learned regarding the role of the FIP in fostering collaboration among REDD+ actors at the country level during the programming process. These lessons are intended to inform the ongoing work of the Climate Investment Funds (CIF), particularly the implementation process for FIP investments, and to enhance the FIP's potential to build and support meaningful REDD+ partnerships at the country level. Lessons learned were developed on the basis of questionnaires and visits to four of the eight FIP pilot countries, as well as interviews with the MDBs, the CIF Administrative Unit, and other REDD+ agencies. [The publication](#)

## **V.I JOBS**

### **Programme Officer**

UNEP - deadline for application is 24<sup>th</sup> of April 2013

The United Nations Environment Programme (UNEP) is the United Nations systems designated entity for addressing environmental issues at the global and regional level. Its mandate is to coordinate the development of environmental policy consensus by keeping the global environment under review and bringing emerging issues to the attention of governments and the international community for action. UNEP's Division of Environmental Policy Implementation (DEPI) works with international and national partners, providing technical assistance and advisory services for the implementation of environmental policy, and strengthening the environmental management capacity of developing countries and countries with economies in transition. A Reducing Emissions from Deforestation and Forest Degradation (REDD+) Team has been established within DEPI to develop a UNEP-wide strategic approach and project portfolio for forests and climate change as part of and to advance the implementation of the UN-REDD Programme ([www.un-redd.org](http://www.un-redd.org)). This post is located in the Terrestrial Ecosystems Unit of UNEP/DEPI, Regional office for Latin America and the Caribbean (ROLAC) at the

Quito duty station. [More](#)

### **Chief Technical Advisor, UN-REDD Sri Lanka Programme (Part-time International Consultant)**

*FAO - deadline for application is 30<sup>th</sup> of April 2013*

The UN-REDD Sri Lanka Programme is seeking a Chief Technical Advisor. Under the supervision of the FAO Representative (FAOR) in Sri Lanka, the technical guidance of the Director FOM (with the technical backstopping of the FAO Forestry Department), and in close collaboration with UN-REDD Management Unit (PMU) and the National REDD+ office, the incumbent will provide support to the implementation of the UN-REDD Sri Lanka programme. [More](#)

### **Regional Technical Advisor Africa**

*UNEP - deadline for application is the 13<sup>th</sup> of May 2013*

The United Nations Environment Programme (UNEP) is the United Nations systems designated entity for addressing environmental issues at the global and regional level. Its mandate is to coordinate the development of environmental policy consensus by keeping the global environment under review and bringing emerging issues to the attention of governments and the international community for action. UNEP's Division of Environmental Policy Implementation (DEPI) works with international and national partners, providing technical assistance and advisory services for the implementation of environmental policy, and strengthening the environmental management capacity of developing countries and countries with economies in transition. Under the direct supervision of the Deputy Director, Regional Office for Africa and the Head UNEP UN-REDD team and in close cooperation with the Chief, Terrestrial Ecosystems Unit, the incumbent will perform the following functions. [More](#)

### **Environmental Economist**

*UNEP - deadline for application is 18th of May 2013*

The United Nations Environment Programme (UNEP) is the United Nations systems designated entity for addressing environmental issues at the global and regional level. Its mandate is to coordinate the development of environmental policy consensus by keeping the global environment under review and bringing emerging issues to the attention of governments and the international community for action. UNEP's Division of Environmental Policy Implementation (DEPI) works with international and national partners, providing technical assistance and advisory services for the implementation of environmental policy, and strengthening the environmental management capacity of developing countries and countries with economies in transition. The post is located in UNEP/DEPI at the Nairobi duty station. [More](#)

## **VII. ANNOUNCEMENTS**

### **Nurture forests for the future**

*FAO*

FAO as part of the UN-REDD Programme believes that Reducing Emissions from Deforestation and forest Degradation (REDD+) can also ensure food security through good agriculture practices, biodiversity conservation, livelihoods diversification, good governance and better land management. That is exactly what we would like you to capture through your lens. Participate in the Nurture forests for the future Photo Contest and send us photos that link forests and REDD+ to food security in your part of the world. Join us to celebrate the fifth anniversary of the UN-REDD Programme and to raise awareness through photos of how REDD+ can contribute benefits for food security. The competition is being held as a part of the International Conference on Forests for Food Security and Nutrition to be held at FAO headquarters from 13-15 May 2013 where the best 25 photos will be exhibited. The winner of the competition will be awarded a photo mission with FAO. The deadline for submission is 25 April 2013. [More](#)



## **CLIM-FO INFORMATION**

The objective of CLIM-FO-L is to compile and distribute recent information about climate change and forestry. CLIM-FO-L is issued monthly.

Past issues of CLIM-FO-L are available on the website of *FAO Forest and Climate Change*:

<http://www.fao.org/forestry/climatechange/en/>

For technical help or questions contact [CLIM-FO-Owner@fao.org](mailto:CLIM-FO-Owner@fao.org)

The Newsletter is compiled by Marc Dumas-Johansen and Susan Braatz.

**We appreciate any comments or feedback.**

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