washplus Weekly
Supportive Environments for Healthy Communities

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This issue focuses on cookstoves and climate change. Improperly designed cookstoves can contribute to Black Carbon (BC) emissions. According to a recent EPA report, there is a general consensus within the scientific community that BC is contributing to climate change at both the global and regional levels. The main sources of BC are open burning of biomass, diesel engines, and the residential burning of solid fuels such as coal, wood, dung, and agricultural residues. The Institute for Governance & Sustainable Development states that BC causes warming primarily in the regions where it is emitted, and therefore merits analysis and solutions at the local scale. The ability of BC to absorb light energy and its role in key atmospheric processes link it to a range of climate impacts, including increased temperatures, accelerated ice and snow melt, and disruptions to precipitation patterns. Recent estimates of black carbon's radiative forcing confirm that it is the second leading cause of global warming after CO2. BC is especially important because it is a short-lived climate forcer, meaning it has a relatively short life span; it remains in the air for mere weeks, unlike CO2, which can remain in the atmosphere for centuries. As such, reducing BC emissions has an immediate impact on climate warming.

RECENT EVENTS

- **July 22-25, 2013 – Meeting of International Working Group of the Climate and Clean Air Coalition (CCAC).** (Link)
  Efforts to reduce emissions of so-called short lived climate pollutants (SLCPs) were given a boost at an international meeting in Mexico City. Members of the Climate and Clean Air Coalition approved multi-million dollar funding to support the more widespread take-up of high quality clean cookstoves that also cut soot or black carbon emissions. Cutting emissions of SLCPs like black carbon, methane and gases could cut the rate of global warming by up to 0.5 degrees C, save millions of lives and reduce crop losses by over 30 million tons a year.

- **July 10-12, 2013 – Nepal Alliance for Clean Cookstoves: Clean Cookstoves Marketplace 2013**. (Background paper) | Presentations |
  The background paper shows there are huge opportunities for all different public and private sector actors in capturing the business and developmental opportunities in Nepal's shift towards clean cooking solutions. Some segments need a higher level of private sector involvement from day one while others will require a more gradual involvement as awareness and capacity building and other enabling environment is created with public funding, until the segment becomes attractive enough for private

sector participation with decreasing level of public funding.

JOURNAL ARTICLES

- **Approaches to Economic Empowerment of Rural Women for Climate Change Mitigation and Adaptation: Implications for Policy**. *IJAAR (1) 2013*. E Ajani. (Full text, pdf)
  This paper addresses the economic empowerment of rural women for climate change mitigation and adaptation. Economic empowerment of women involves having access to quality education, organizing training programs to sensitize the rural women on the use of drought-resistant crop varieties, pests and diseases resistant crop varieties, crop diversification to guard against crop failure, use of energy-efficient cooking stoves, among others. The study recommends that measures to promote the economic participation of women can be integrated into climate mitigation and adaptation initiatives.

- **Bounding the Role of Black Carbon in the Climate System: A Scientific Assessment**. *Jnl of Geophysical Research: Atmospheres, June 2013*. T Bond. (Full text, pdf)
  The uncertainties in net climate forcing from black-carbon-rich sources are substantial, largely due to lack of knowledge about cloud interactions with both black carbon and co-emitted organic carbon. In prioritizing potential black-carbon mitigation actions, non-science factors, such as technical feasibility, costs, policy design, and implementation feasibility play important roles. The major sources of black carbon are presently in different stages with regard to the feasibility for near-term mitigation. This assessment, by evaluating the large number and complexity of the associated physical and radiative processes in black-carbon climate forcing, sets a baseline from which to improve future climate forcing estimates.

- **Cleaner Cooking Solutions to Achieve Health, Climate, and Economic Cobenefits**. *Env Sci Technol, Apr 2013*. S Anenberg. (Full text, pdf)
  The impact of cleaner cooking solutions on fuel use and air pollutant emissions varies by fuel type, stove design, cooking practice, and environmental conditions. Recent studies have found that many of the stoves on the market reduce fuel use by 30 to 60%. Less fuel use can lead to transformative benefits: less burden for women or more income for families and less risk of violence for women and girls as they collect fuel in certain insecure areas. Reduced fuel use due to increased heat transfer efficiency can also mean fewer emissions of air pollutants that affect health and climate and reduced impacts on forests, habitats, and biodiversity.

- **Climate's Dark Forcings**. *Science, Apr 2013*. M Andreae. (Full text, pdf)
  The magnitude of global warming from black carbon has been the subject of intense debate. A recent comprehensive assessment synthesized available model results and observations, and proposed a "best estimate" for BC's global climate forcing. Unlike greenhouse gases, BC is not a single, chemically defined substance with constant physical properties. In addition to the aggregates of nanometer-scale carbon spherules traditionally thought of as BC, the atmosphere contains light-absorbing organic or "brown" carbon (BrC). BrC may account for 15 to 50% of light absorption in the atmosphere and in snow and ice and has different optical properties and source and sink patterns from BC. In addition to combustion sources, especially biomass burning, BrC is also produced by atmospheric chemical reactions, a source not considered in

emission inventories.

- **Household Air Pollution in Low- and Middle-Income Countries: Health Risks and Research Priorities**. *PLoS Med, 10(6) 2013*. W Martin. (Full text)
  Traditional methods of cooking and heating have been used for many generations and are adapted to local dietary, environmental, and cultural needs. Household fuel combustion contributes to outdoor air pollution and climate change and, in some regions, fuel-gathering for inefficient stoves contributes to environmental degradation, including deforestation and desertification.

- **Indoor Air Pollution and Child Health in India**. *Child Poverty Insights, June 2013*. UNICEF. (Full text, pdf)
  In India indoor air pollution is among the most serious threats to the health of children under age five. The Energy and Resources Institute (TERI) has actively highlighted the risks associated with indoor air pollution and advocated the adoption of cleaner and sustainable alternatives. Nearly 82% of pregnant women in rural India are exposed to biomass-related indoor air pollution, which increases the risk of low birth weight. India derives the bulk of its cooking energy needs from biomass solid fuels, such as twigs, wood, shrubs, crop residue or cow dung and utilize crude combustion apparatus cook stoves. The burning of biomass fuels releases various indoor air pollutants, like particulate matter, carbon monoxide and volatile organic compounds.

- **Real-Time Assessment of Black Carbon Pollution in Indian Households Due to Traditional and Improved Biomass Cookstoves**. *Env Sci Technol, Feb 2012*. A Kar. (Abstract)
  Use of improved (biomass) cookstoves (ICs) has been widely proposed as a Black Carbon (BC) mitigation measure with significant climate and health benefits. ICs encompass a range of technologies, including natural draft stoves, which feature structural modifications to enhance air flow, and forced draft stoves, which additionally employ an external fan to force air into the combustion chamber. Project Surya, conducted the first real-time in situ BC concentration measurements from five commercial ICs and a traditional (mud) cookstove for comparison. These experiments reveal four significant findings about the tested stoves.

- **Tackling the Health Burden from Household Air Pollution (HAP): Development and Implementation of New WHO Guidelines**. *Air Quality and Climate Change, 47(1) 2013*. N Bruce. (Full text, pdf)
  Patterns of household fuel use can have negative impacts on safety, prospects for poverty reduction and the environment, including climate change. Building on previous air quality guidelines, the WHO is developing new guidelines focused on household fuel combustion, covering cooking, heating and lighting. As discussed in this paper, currently in development, the guidelines will include reviews of a wide range of evidence including fuel use in homes, emissions from stoves and lighting, household air pollution and exposure levels experienced by populations, health risks, impacts of interventions on HAP and exposure, and also key factors influencing sustainable and equitable adoption of improved stoves and cleaner fuels.

- **Transforming Household Energy Practices to Reduce Climate Risks: Charcoal Use in Lusaka, Zambia**. *Boiling Point, July 2013*. A Atteridge. (Full text)
  Finding ways to reduce charcoal use can reduce the probable impacts of climate change

for poor communities. Transforming energy markets for the poor is never easy, as decades of unsuccessful cookstove interventions can attest to. However, by better understanding what households want and need it is possible to identify a number of policy and technical solutions that could change behavior at scale. These include improved cookstoves that have a greater resemblance to the existing mbaula stoves and are locally produced, simple solar water heating devices, as well as electricity price re-structuring to lower tariffs for the poor.

REPORTS

- **Assessing the Climate Impacts of Cookstove Projects: Issues in Emissions Accounting**, 2013. C Lee. (Full text, pdf)
  An estimated 2.6 billion people rely on traditional biomass for home cooking and heating, so improving the efficiency of household cookstoves could provide significant environmental, social and economic benefits. Some researchers have estimated that potential greenhouse gas emission reductions could exceed 1 billion tons of carbon dioxide equivalent (CO_2e) per year. This paper evaluates the quantification approaches to three key variables in calculating emission impacts: biomass fuel consumption, fraction of non-renewable biomass, and emission factors for fuel consumption.

- **Energy Access and Biomass Resource Transitions in Malawi Policy Brief**, 2013. Stockholm Environment Institute. (Full text, pdf)
  Energy access and associated economic development goals in Malawi are threatened by the tremendous pressure on forest resources, which will require, first and foremost increasing agricultural productivity. Other important measures include use of improved cookstoves and fuel-switching in the household energy sector. Synergies between expanded biofuels production and reduction in traditional biomass use could be explored through fuel substitution in cooking, heating and lighting for households and small enterprises. Such synergies would promote low-carbon pathways while also improving energy access and stimulating agricultural and rural development.

- **Indonesia: Toward Universal Access to Clean Cooking, 2013.** World Bank. (Full text)
  The main disadvantages of biomass energy for cooking using primitive cookstoves are linked to incomplete fuel combustion. Indoor emissions from traditional biomass cookstoves are responsible for about 165,000 premature deaths—mainly those of women and children—each year in Indonesia. In addition, in areas where demand for biomass fuels exceeds sustainable supply, fuelwood collection can lead to deforestation, land degradation, and desertification. Yet under conditions of sustainable production and more efficient fuel use, biomass energy is a renewable resource that is affordable to the poor. Biomass fuels are abundant in Indonesia, can be burned without further processing, and are cheaper than most alternative fuels. If used in an efficient and clean way, biomass stoves could contribute significantly to the country's green growth agenda.

- **Primer on Short-Lived Climate Pollutants**, 2013. Institute for Governance & Sustainable Development. (Full text, pdf)
  Black carbon is a potent climate-forcing aerosol that remains in the atmosphere for only a few days or weeks. It is a component of soot and is a product of the incomplete combustion of fossil fuels, biofuels, and biomass. Black carbon contributes to climate

change in several ways: it warms the atmosphere directly by absorbing solar radiation and emitting it as heat, it contributes to melting by darkening the surfaces of ice and snow when it is deposited on them, and it can also affect the microphysical properties of clouds in a manner than can perturb precipitation patterns. Recent estimates of black carbon's radiative forcing confirm that it is the second leading cause of global warming.

- **Use of Bochar for Soil Health Management and Greenhouse Gas Mitigation in India: Potential and Constraints**, 2013. C Srinivasarao. (Full text, pdf)
  Several studies across the world have established that biochar application increases conventional agricultural productivity and mitigates greenhouse gas emissions from agricultural soils. However, to promote the application of biochar as a soil amendment and also as a climate change abatement option, research, development and demonstration on biochar production and application is very vital. It is necessary to develop low-cost biochar kilns to make the technology affordable to small and marginal farmers. Further, inter-disciplinary and location-specific research has to be taken up for studying the long term impact of biochar application on soil physical properties, nutrient availability, soil microbial activities, carbon sequestration potential, crop productivity, and greenhouse gas mitigation.

- **What Have We Learned about Household Biomass Cooking in Central America?** 2013. World Bank. (Full text, pdf)
  This study finds that the use of biomass for cooking in the region will likely continue to be significant for a long time due to population growth, high incidence of poverty, high prices for household gas—liquefied petroleum gas (LPG)—coupled with unsustainable LPG subsidies, as well as relatively easy access to fuelwood in the region. Useful lessons can be learned from the last decade of experience in Central America and other regions in promoting improved stoves. Providing households with clean and efficient cooking solutions is not just an energy issue, but touches on poverty, gender inequality, public health, environmental sustainability, climate change, agriculture, and local employment.

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