



More Than Just a Field Fire: Open Burning Definition and Impacts

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What is “Open Burning”?

- Use of fire for any purpose in agro-forestry sector, eg not merely “residue burning” but also:
 - ✓ Burning of crop stubble prior to next planting
 - ✓ Clearing of weeds/parasites in fields or orchards
 - ✓ Clearing of land for cultivation (“first use;” reclaiming; slash-and-burn)
 - ✓ Pasture burning to “renew” grass
 - ✓ Clearing of understory prior to lumber harvest
 - ✓ Does NOT include prescribed burns on wildlands or emergency fire prevention
- Includes primary “set” fire as well as fires that spread from the original fire

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Open Burning Impacts: Air, Water, Soil

- Burning increasingly seen as **PRIMARY** source of air pollution despite its **EPISODIC** or **SEASONAL NATURE**
 - ✓ Higher mortality from respiratory or cardiac illness, especially among young and elderly
 - ✓ Higher morbidity **INCLUDING LONG AFTER FIRE EVENT** from respiratory illness (asthma, pneumonia)
 - ✓ Also increased mortality/morbidity due to vehicle accidents caused by low visibility, fire itself
- Radically decreases soil fertility, leading to **25-35% greater need for fertilizer** for next crop
- More brittle soils and fertilizer use → More run-off and water pollution; and secondary air pollution (?ammonia?)

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Open Burning Impacts: Climate, Wildfires, Infrastructure

- Emissions, and therefore health and climate impacts, travel great distances.
- Wildfires spread from set agricultural fires damage infrastructure and lead to additional pollution.
- Set fires, AND the fires that spread from them, release methane, CO, CO₂ -- and black carbon.
- Not carbon-neutral due to humus C loss
- Largest single BC source globally (36%).
- BC close to cryosphere (snow and ice)=more intense regional warming/glacier and snow melt.

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Farmer-focused Approach

- Mapping of fires nationally/regionally over at least a decade.
- Outreach to farmers, regional experts and governments through conferences and missions: Why do just these farmers burn? What crops do they burn? What are the alternatives?
- Demonstration projects – show it can be done at local level – combined with policy work with local, regional, national governments.
- Continued mapping and public outreach (previous slide, Twitter, etc.)
- International expert involvement and engagement (“Strategic Support Groups,” mapping groups and networks).

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Better Monitoring Technology: Better Tracking of Sources and Emissions

- New VIIRS satellite mapping captures 4-6x more fires than older MODIS satellites
- VIIRS can differentiate crops and burning conditions (plant mass, dry/wet), with more reliable emissions estimates
- Burning is NOT carbon neutral: add to suite of negative-carbon tools

Peru, 2015-17 from VIIRS

(compare with total 159,000,000 Mt CO₂ in 2012):

YEAR	Black Carbon Mt	CO ₂ Mt	CH ₄ Mt	PM _{2.5} Mt
2015	54,605	170,856,059	537,797	940,285
2016	64,944	203,061,615	640,856	1,121,869
2017	45,189	141,136,684	446,023	772,418

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Low-cost Alternatives

- **GOOD ALTERNATIVES EXIST: Burning very rarely “needed”**
- **Crop Stubble:**
 - **Low-Till: Incorporate stubble into soil**
 - **No-till/direct seed: Plant through stubble**
 - **Conservation agriculture: adds cover crops, manure**
 - **“Harvest” and monetize straw: for bedding, pellets, bricks**
- **Clearing Understory: Mechanical removal and incorporation or production of wood chips**
- **Pasture: Harvest for hay (burning does not “fertilize”)**
- **Farmer Education and Incentives KEY: may include micro-financing**

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Lessons Learned:

- **NO-BURN ALTERNATIVES SUPPORT SDG GOALS: food security, greater economic security, adaptation/resilience, cleaner water, family health, soil and climate all benefit**
- **DON'T DEMONIZE THE FARMER: No farmer “likes” to burn, but lack reliable alternatives and support for transition – simply banning burning never works**
- **CHANGE CAN COME QUICKLY: Example of Baltics/Poland with EU accession; Argentina/Eastern Bolivia this decade**

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“New” Aspects

- **Health Impacts**
 - Growing body of evidence from wildfire studies
 - Very young especially long-term impacts
- **Yields and Fertilizer Use**
 - Higher yields confirmed *when not offset by fertilizer*
 - 25-35% less fertilizer needed
- **Erosion, water pollution and eutrophication**
- **Soils as carbon sink (or at least not source)**

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Workshop Issues

- **Definitional:**
 - Which fires? (“four grains” to all-sector)
 - Which origins? (“four grains” to “all wildfire”)
 - Which land types? (croplands to all)
- **Modeling in Arctic region**
 - Global v. regional models
 - Different treatment of deposition; transport to Arctic; seasonality of snow/ice cover; indirect effect
- **Mitigation feasibility and impacts**
 - Especially crop yields, health, N₂O

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