International Biochar Initiative

www.biochar-international.org

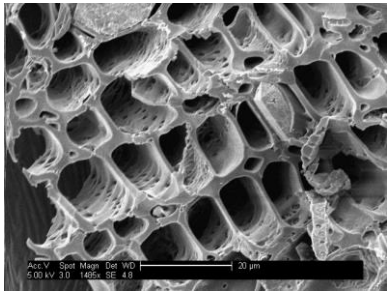
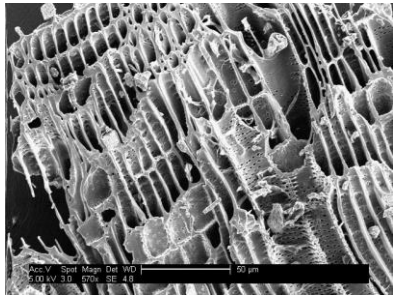
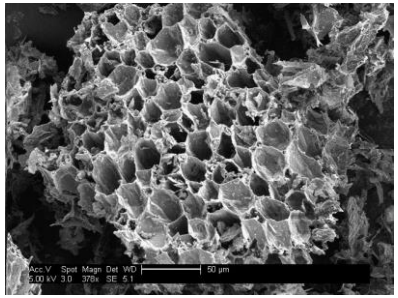
About the International Biochar Initiative

The International Biochar Initiative provides a global platform for fostering stakeholder collaboration, good industry practices, and environmental and ethical standards to support biochar systems that are safe and economically viable.

Learn more: *https://biochar-international.org/*

Biochar & Carbonization

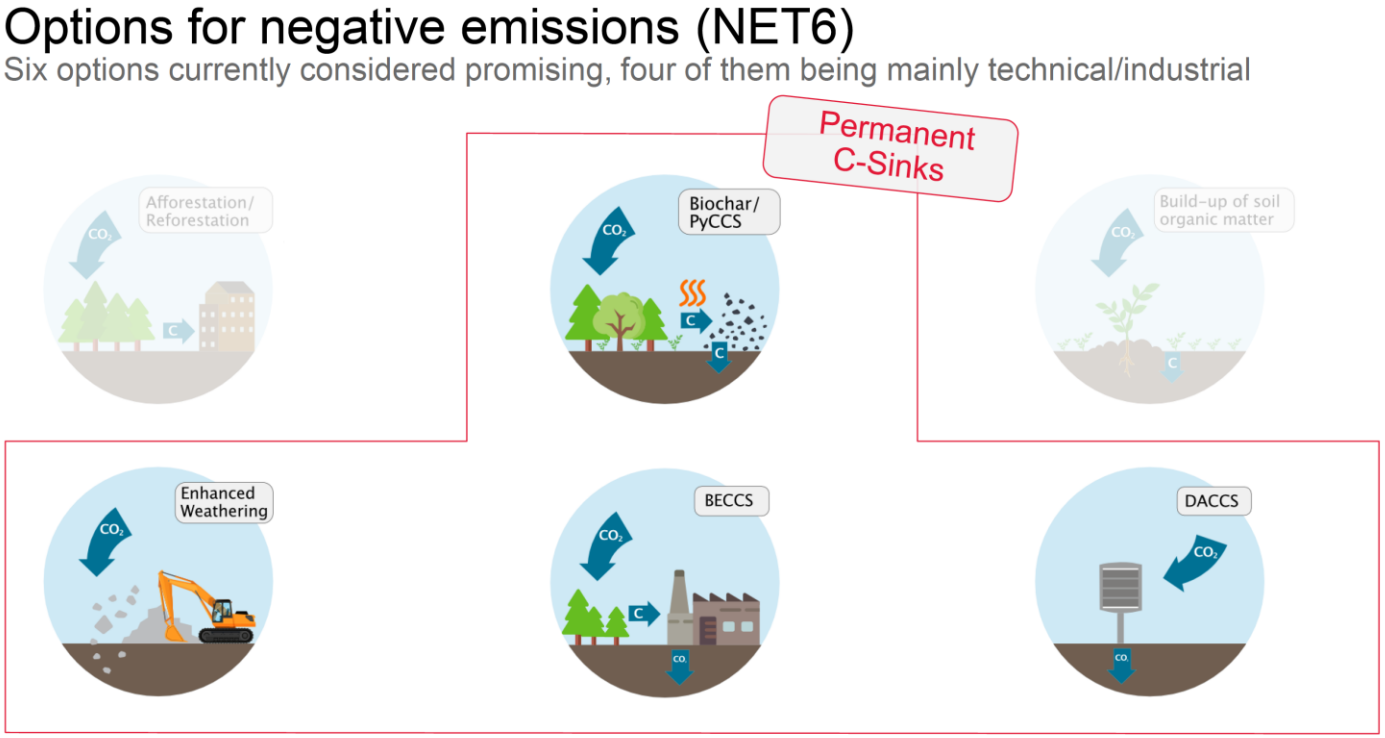
BIOCHAR: organic matter (e.g. crop residues, invasive species, manures, woody biomass, etc.) heated in an oxygen limited environment at high temperatures. Converts up to 50% of original carbon content into stable carbon which, when buried in soil or embedded in other long-lived products, does not return to the atmosphere as it would normally during decomposition.

CARBONIZATION: thermo-chemical conversion of organic matter heated in oxygen limited environment (pyrolysis or gasification). Depending on the technology, the co-products generated include: heat, biochar, bio-oil, wood vinegar and/or syngas.

Pyrolysis with Carbon Capture & Storage (PyCCS)

PyCCS: Many pyrolysis technologies produce solid, liquid and gaseous pyrolysis products. To date most of the sequestration focus has been on the solid fraction (i.e., biochar) which leads to 20 – 30% carbon sequestration depending on many factors. However, the liquids (i.e., bio-oil) can be injected into deep wells elevating carbon sequestration potential to >70% of the original biomass.



Biochar & Carbonization

Beneficially impact 12 of the 17 UN SDGs

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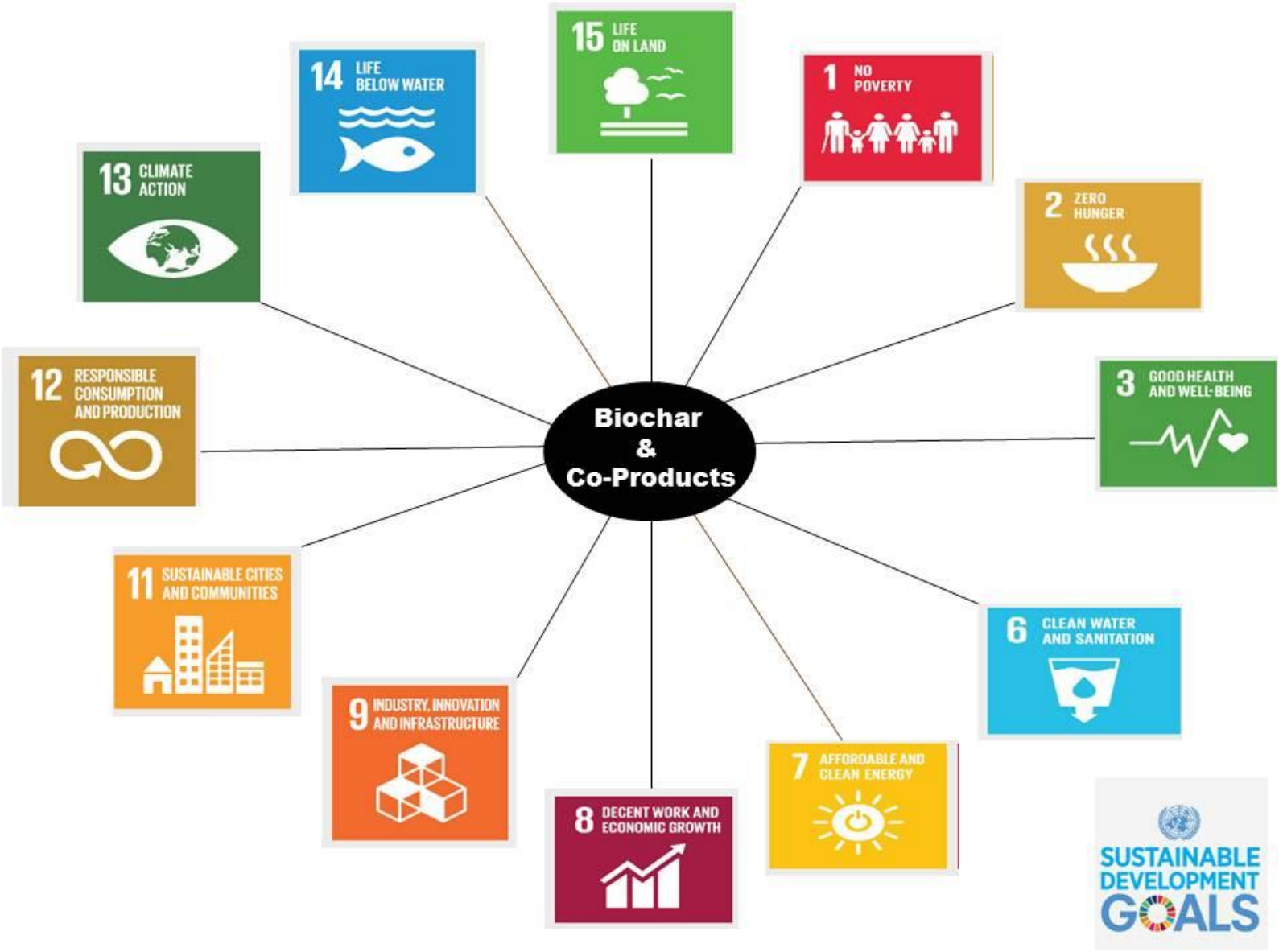


1. NO POVERTY

- Increase yields & revenues
- Carbon credit payments to carbon farmers
- Decrease reliance on off farm purchases

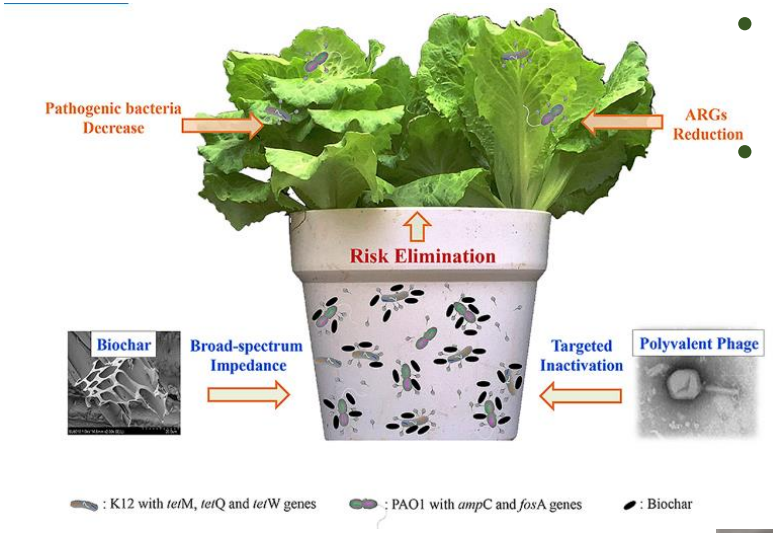
2. ZERO HUNGER

- Increase crop yields
  - Resist disease
  - Regenerate poor soils

B4SS demonstration site in South Sumatra

3. GOOD HEALTH AND WELL-BEING

- Improve food safety
  - Immobilize heavy metals, toxins in soils
  - Reduce bacteria (e.g.. E.coli)
- Reduce air pollution from crop burnng



- Eliminates need for antibiotics in animal feed
- Reduces plant uptake of heavy metals (e.g. cadmium, lead, etc.)

SOURCE: Ye, Mao, Mingming Sun, Yuanchao Zhao, Wentao Jiao, Bing Xia, Manqiang Liu, Yanfang Feng et al. "Targeted inactivation of antibiotic-resistant Escherichia coli and Pseudomonas aeruginosa in a soil-lettuce system by combined polyvalent bacteriophage and biochar treatment." *Environmental Pollution* 241 (2018): 978-987.

6. CLEAN WATER AND SANITATION

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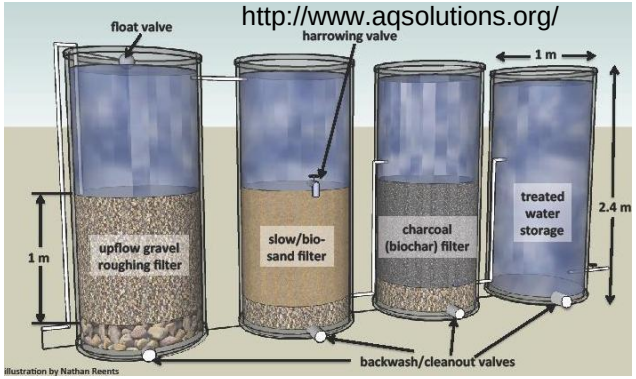
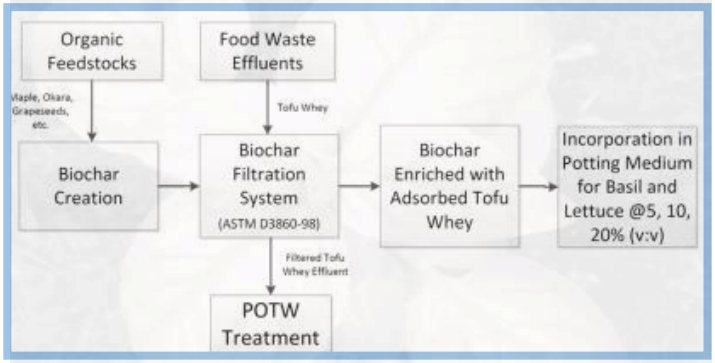
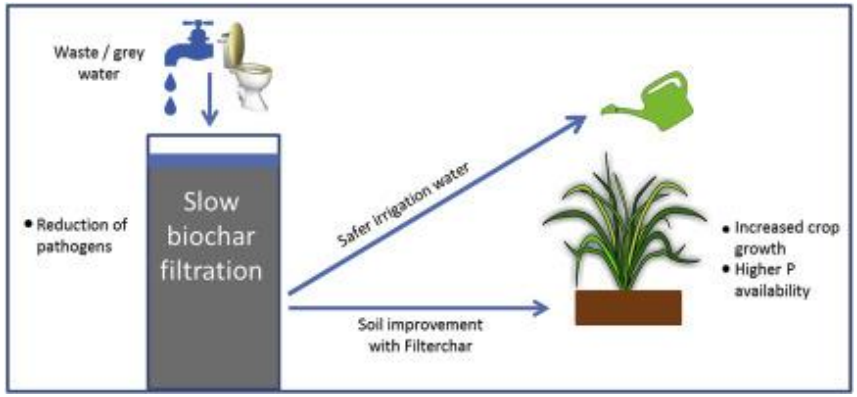
- Filter heavy metals, emerging contaminants of concerns, antibiotics
- Harvest nutrients that might cause eutrophication
- Reduce sewage & toxins





Barber, Steven T., Jingjing Yin, Kathleen Draper, and Thomas A. Trabold. "Closing Nutrient Cycles with Biochar-From Filtration to Fertilizer." *Journal of Cleaner Production* (2018).



Werner, Steffen, Korbinian Kätzl, Marc Wichern, Andreas Buerkert, Christoph Steiner, and Bernd Marschner. "Agronomic benefits of biochar as a soil amendment after its use as waste water filtration medium." *Environmental Pollution* 233 (2018): 561-568.

7. AFFORDABLE AND CLEAN ENERGEY

- Generate remote, renewable carbon negative electricity
- Create heat for use in cooking, drying, water purification, etc.
- Boost quantity & quality of biogas CH4

Running a micro gasifier with coffee pulp to roast coffee beans and make biochar in Laos.

Pyrolysis machine designed by Okozentrum, carbonizing coffee husks and generating energy in Vietnam

8. DECENT WORK AND ECONOMIC GROWTH

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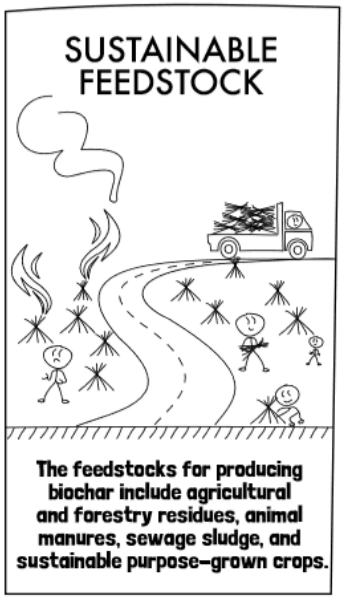
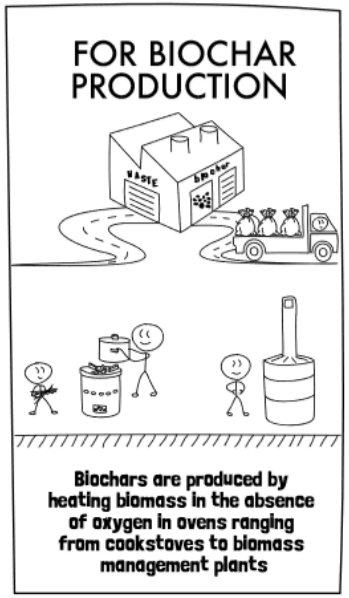
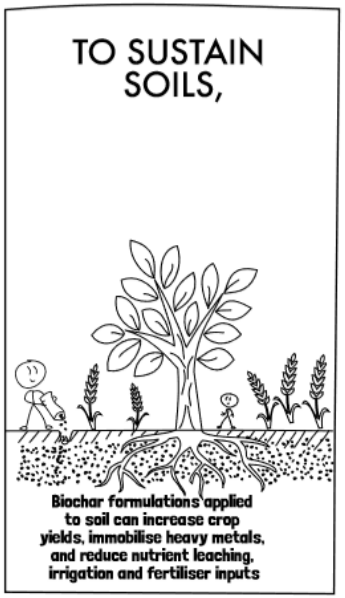
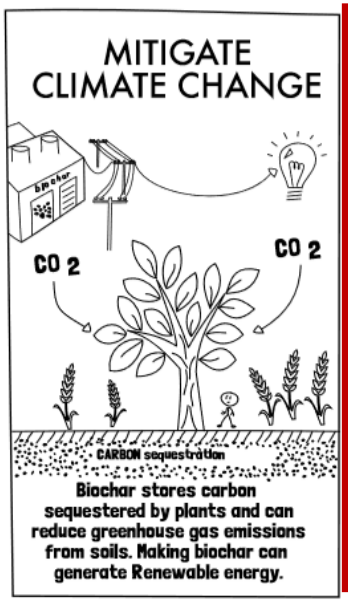
- Create new local job opportunities to upcycle waste, generate new products,
- Support small farmers via carbon economies

POTENTIAL BENEFITS OF BIOCHAR









Biochar for Sustainable Soils project

9. INDUSTRY, INNOVATION AND INFRASTRCTURE

- Create new carbon negative products: building materials, composites,
- Construct biochar based green roofs
- Harvest nutrients in effluents for reuse & lower water requirements

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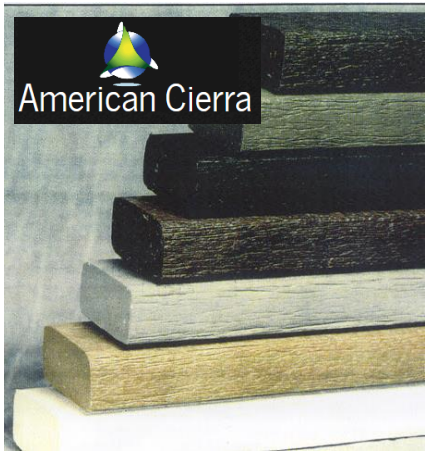
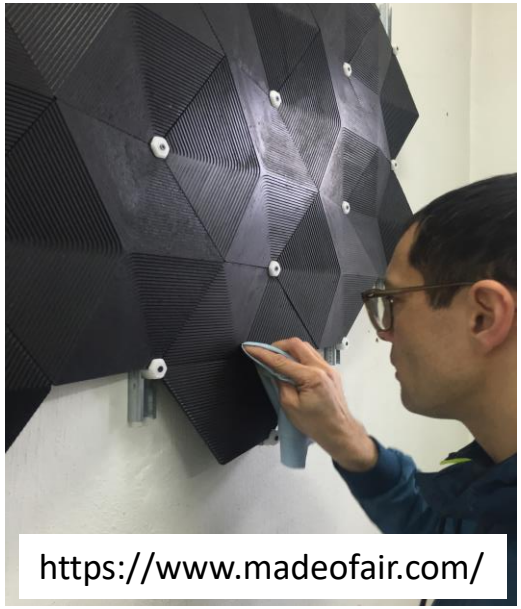
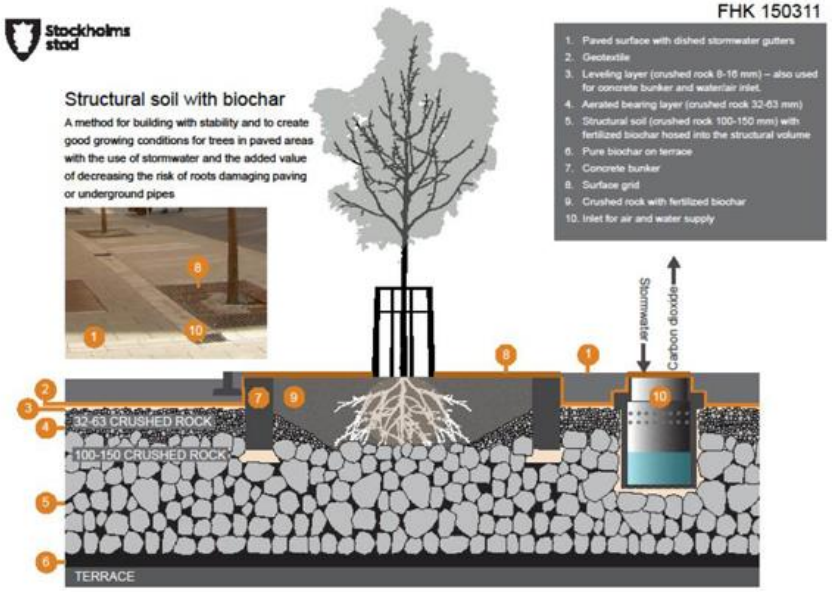
Biochar plaster used to improve humidity control and electro magnetic shield in Valais, Switzerland





11. SUSTAINABLE CITIES AND COMMUNITIES

- Divert organics from landfill to pyrolysis
- Generate renewable district heat
- Manage storm water using biochar



12. RESPONSIBLE CONSUMPTION AND PRODUCTION

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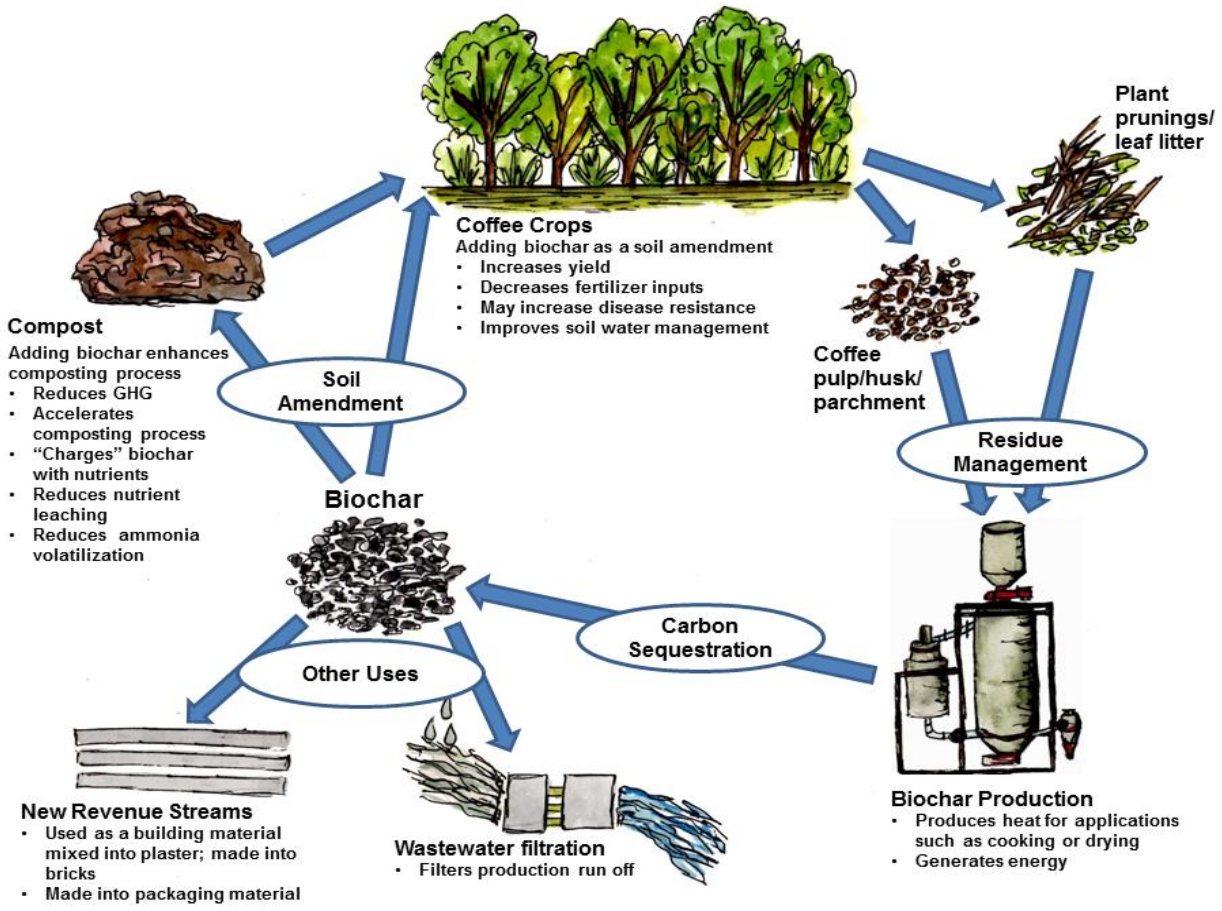
- Reduce organics to landfill by 75%+
- Displace high carbon footprint materials with biochar (e.g. carbon black)
- Lower GHG of food production & processing



13. CLIMATE ACTION

- Sequester carbon
- Replace fossil fuel energy with pyrolysis
- Reduce GHG from landfills, manure management

MITIGATION

Carbon Sequestration

Reduced Fertilizer Use

Methane Reductions
- **Livestock:** enteric, manure
- **Landfills**

Renewable Energy

Waste Upcycling

ADAPTATION

Food Security

Water Efficiency

Building/Infrastructure

Stormwater Management

Vegetation Management
- **Fire Control**
- **Invasive Species**

Disaster Recovery

Sustainable Agriculture

Soil Resilience

Green Roofs

14. LIFE BELOW WATER

- Manage storm water
- Reduce nutrient pollution
- Clean up spills with biochar
- Carbonize aquatic invasive species

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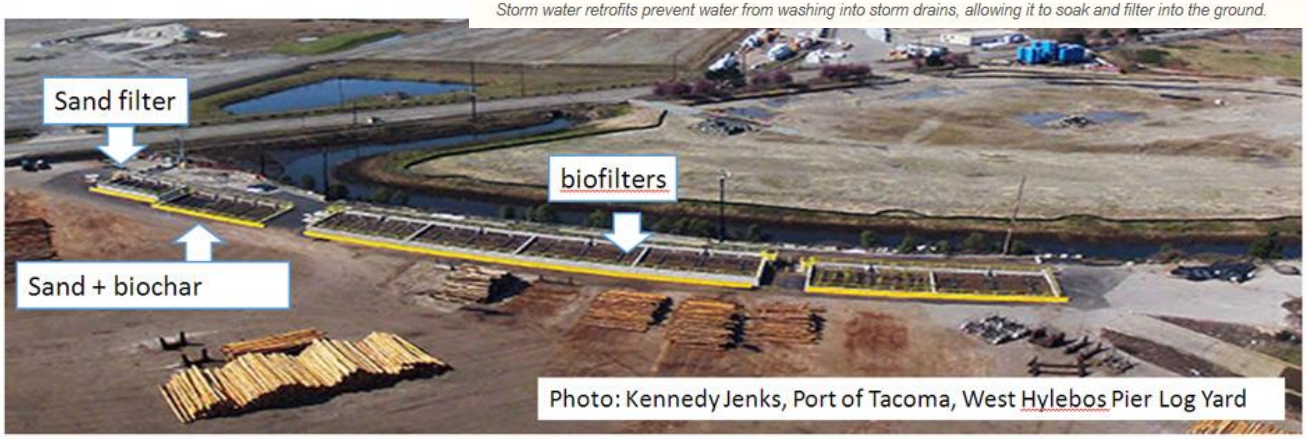
Storm water retrofits prevent water from washing into storm drains, allowing it to soak and filter into the ground.



15. LIFE ON LAND

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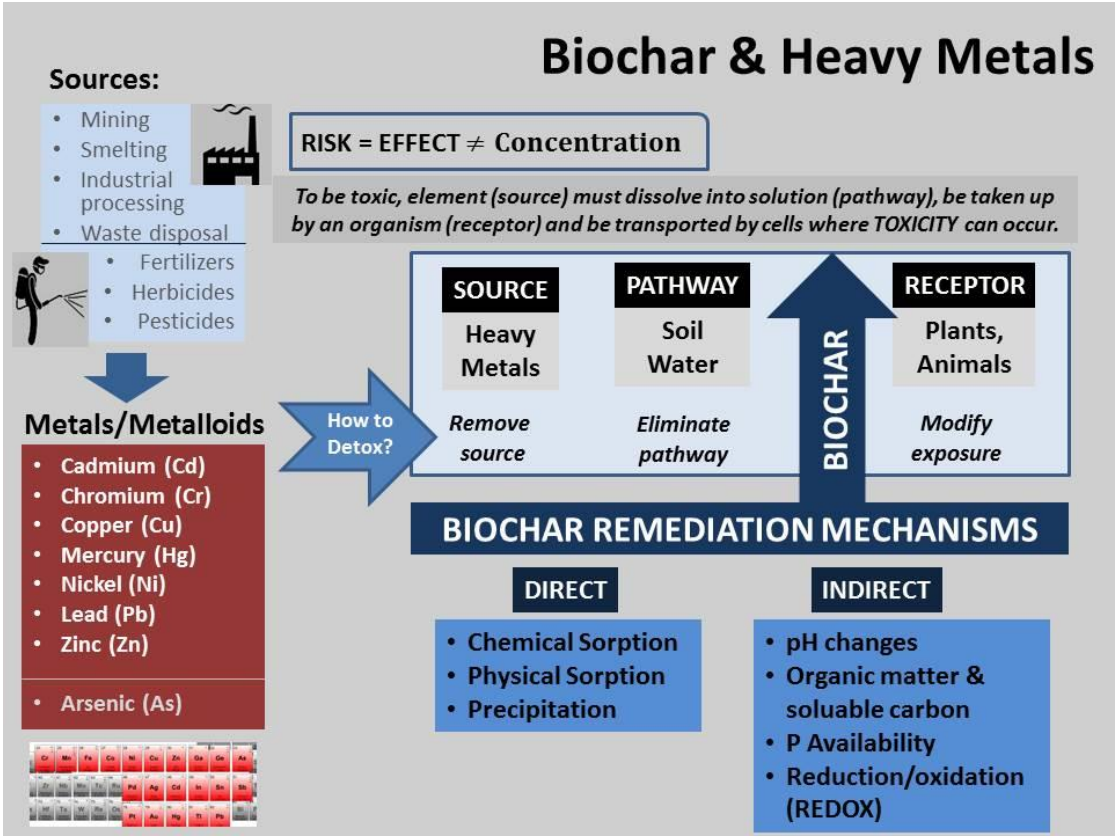
- Reclaim soil
- Remediate soil
- Restore: deserts, forests, acidic or saline soils

- Mitigates soil salinization & acidification
- Minimizes bioavailability of contaminants
  - Heavy metals
  - PCBs
  - Antibiotics



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