

Environmental Dynamics of Cannabis Cultivation

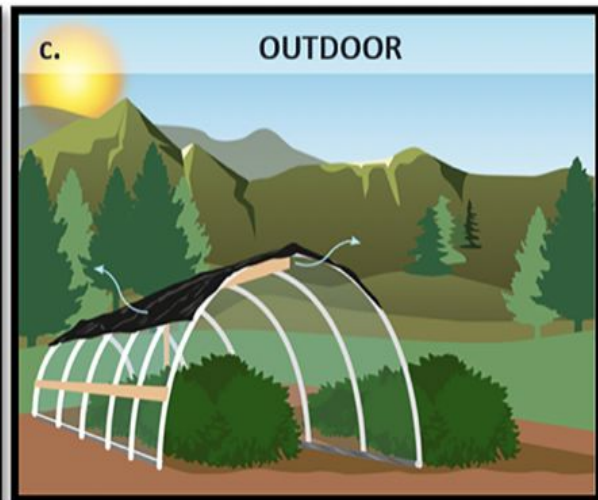
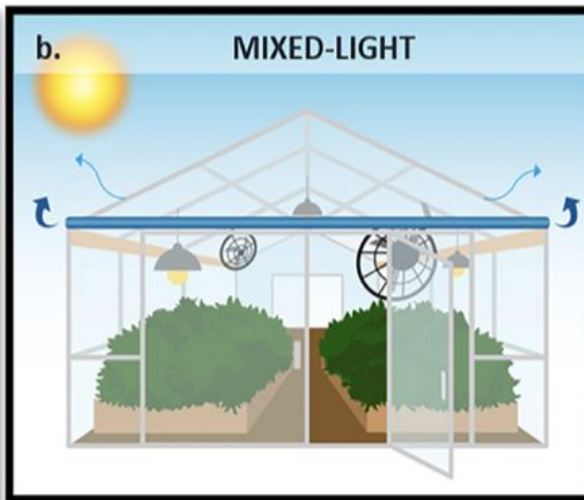
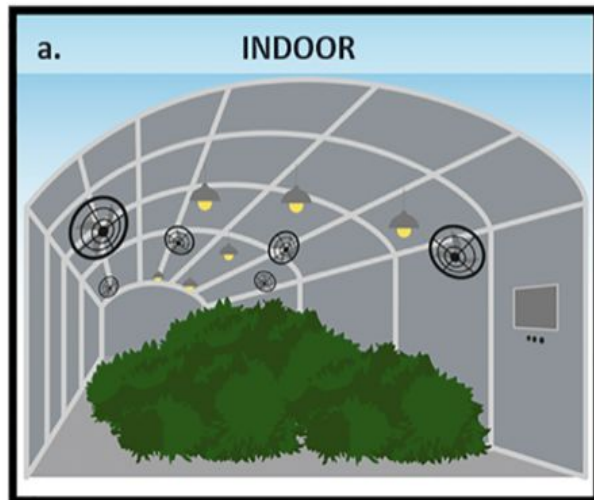
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What are the
environmental
effects of cannabis
production?



Closed system
Higher energy inputs
Low permeability
Municipal water sources
Urban land use

Open systems
Lower energy inputs
High permeability
Rural water sources
Rural land use

Cannabis Production & Environmental Effects

Land Use Change

- CA: 460 ha (canna) vs. 9.8m ha (ag); .
 - US supply: 01% of land
- Forest Loss 1.1% cannabis vs. 55.3% timber in Humboldt)
- “Legacy” Locations Are Remote & Sensitive & Socially Clustered
- Legalization moves growers out of sensitive areas
- Legalization effective at redirecting farms to less sensitive areas

Pesticide Use

- Few consistent standards for ag
- Illegal grows: Small documented effects on surrounding wildlife
- Legalization: Proper Storage & Approval

Energy Use

- Sources: lights, fertilizer production, water pumping, air circulation, etc.
- Outdoor very low
- Indoor: 5x more than greenhouse cultivation of vegetables/flowers
- 2012: indoor canna = 3% of total CA energy; 1% of national energy
 - = 3m cars in emissions

Cannabis Production & Environmental Effects

Water Use

- *Outdoor: highest pre-harvest (dry periods)*
- *Indoor: lower but all year*
- *Humboldt: .0002% of crop water use*
- *In one CA watershed 80% lower than residential use & depletion*
- *Groundwater vs. Surface Water = Different Effects*
- *Illegal vs. Legal: Greater surface water extraction by unlicensed growers during dry periods*
 - *Licensing could reduce water extraction by 50%*
- *Forbearance/storage effective in preventing de-watering – could reduce by 50%*
 - *Otherwise, effects on land & water species and ecosystems*

Legalization Can Control for Environmental Impacts

You cannot regulate
what you make illegal

Prohibition vs. Regulation

Legalization & Environmental Regulation

Description and Successes

- Cultivators open to environmental regulation
 - Numerous environmental requirements
 - Roads, Species, Trees, Testing...
 - Positive Effects:
 - Organic + Status - Most Environmentally Regulated Crop in US
 - Water Use & Forbearance
 - Locations Less Sensitive
 - Education & Open Discussion of Sustainable Practices
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Legalization & Environmental Regulation

Challenges

- Push to Marginal Lands
 - Local Control Decides Location
 - Out of Agricultural Land → Into Sensitive Ecologies
 - Fire-Prone Areas
 - Social Marginalization
- Stringent Requirements and High Costs Make Small Farms Difficult
 - Small Farms Can Be Beneficial to Environment & Economic Development
- Regulation May Encourage Consolidation with Negative Effects

Is it possible to have an environmentally sustainable agriculture, built upon small farmer production?

Measures to Promote Environmental Sustainability

- Enforcement
 - Accountability valuable
 - Just Cannabis? Other Land Use?
 - Discourages Legal Market Participation
 - Enforcement Can = Negative Enviro Consequences
 - From Contention to Cooperation
 - Retraining



Measures to Promote Environmental Sustainability

- Certification
- Appellations (Geographic Designations)
- Tax Incentives & Exemptions
- Restoration Grants of Old Sites
- Compliance Grants, especially for small farmers
- Cooperatives
 - Collectivize Costs, Best Enviro Practices, Helps Small Farms
- Policies to Build Environmental Protection Costs Into Markets/Price
 - *US Tobacco as Example*
 - *Allotments / Percentages*
 - *Price Setting & Auctions*
 - *Internalizes Enviro Costs & Enables Small Farmers*

Thank You!

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Cannabis Research Center

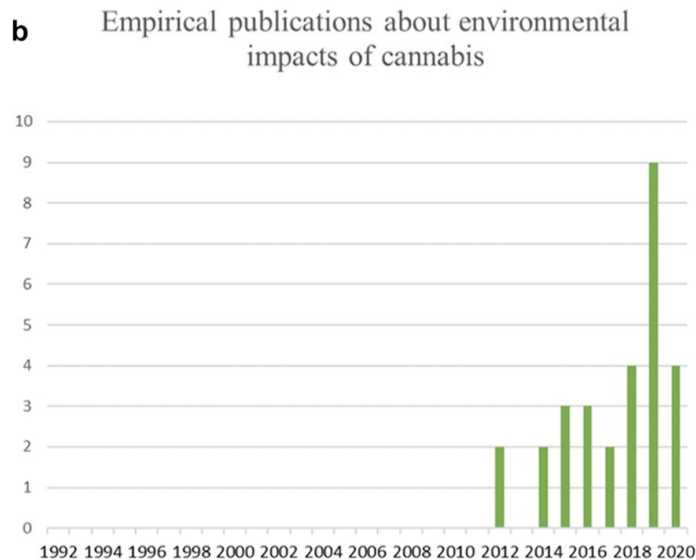
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The Limits of Research

Timing, Data & Prohibition



- Pre-Legalization or Post-Legalization Data
- Environmental research done largely since 2010
- CA: Research in the “Green Rush”
- “Quasi-Legal Challenge” (Gianotti et al 2017)
 - Limited/Remote Methods
 - Law Enforcement Role in Data
- How do we know what we know?

Prohibition & The Environment

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Official Harms or Occluded Stewardship?

- **Campaign Against Marijuana Planting (1983-2011):** Public relations strategy to highlight environmental harms of production
- **1986:** Forest Service involved
- **Late 1990s:** Forest Service targets CA
 - *Doubling of eradication b/t 2001-4*
 - *Multi-Agency Efforts 2008-2012*
 - *Drove articles on environmental impacts (Few in 1996; 2016: 2000)*
- **2010-2016:** Environmental harm becomes central to legalization debate
 - Retrenchment of prohibition amidst legitimation – drive to strict rules

Environmental Tradition Among Cultivators

- “Back to the Land” Cultivation & “Family” Farm Stewardship
 - Communal Values & Self-Interest
- Grow It in the Sun (2008): Stop Pollution & encourage Sun-Grown
- Advocating for Sustainability in Legalization – California Growers Association & Environmentalists
 - Shaped local / national debates