

An Analysis of Policies to Promote Agroforestry for Greenhouse Gas Sequestration in Hawai'i



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Prepared For: The State of Hawai'i Greenhouse Gas Sequestration Taskforce

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Outline



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5. Recommendations
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1. Diagnosis of the Policy Issue

1.1 What is Agroforestry?

The ***intentional*** combination of agriculture and trees to create sustainable farming systems.



Silvopasture



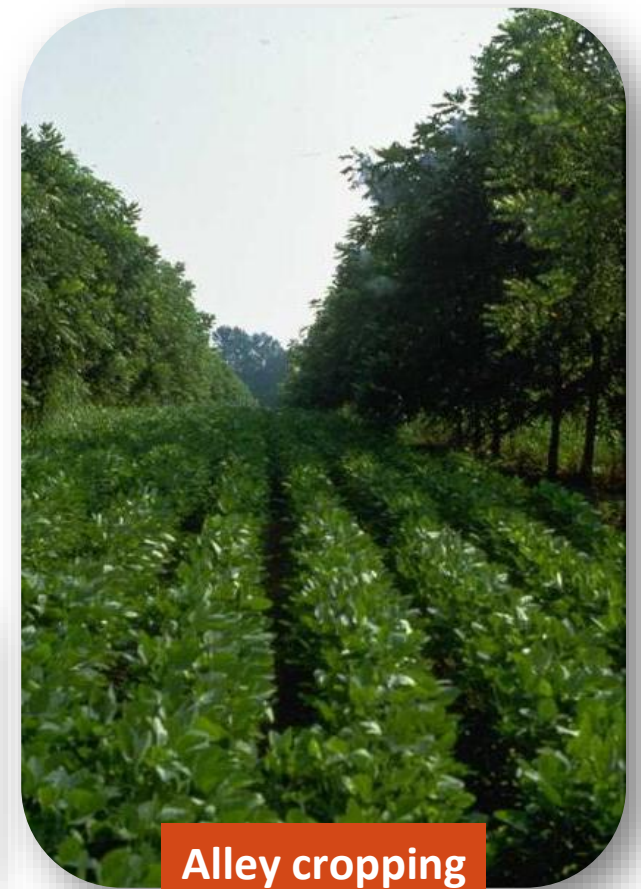
Multi-story / Forest farming



Windbreaks



Riparian buffer



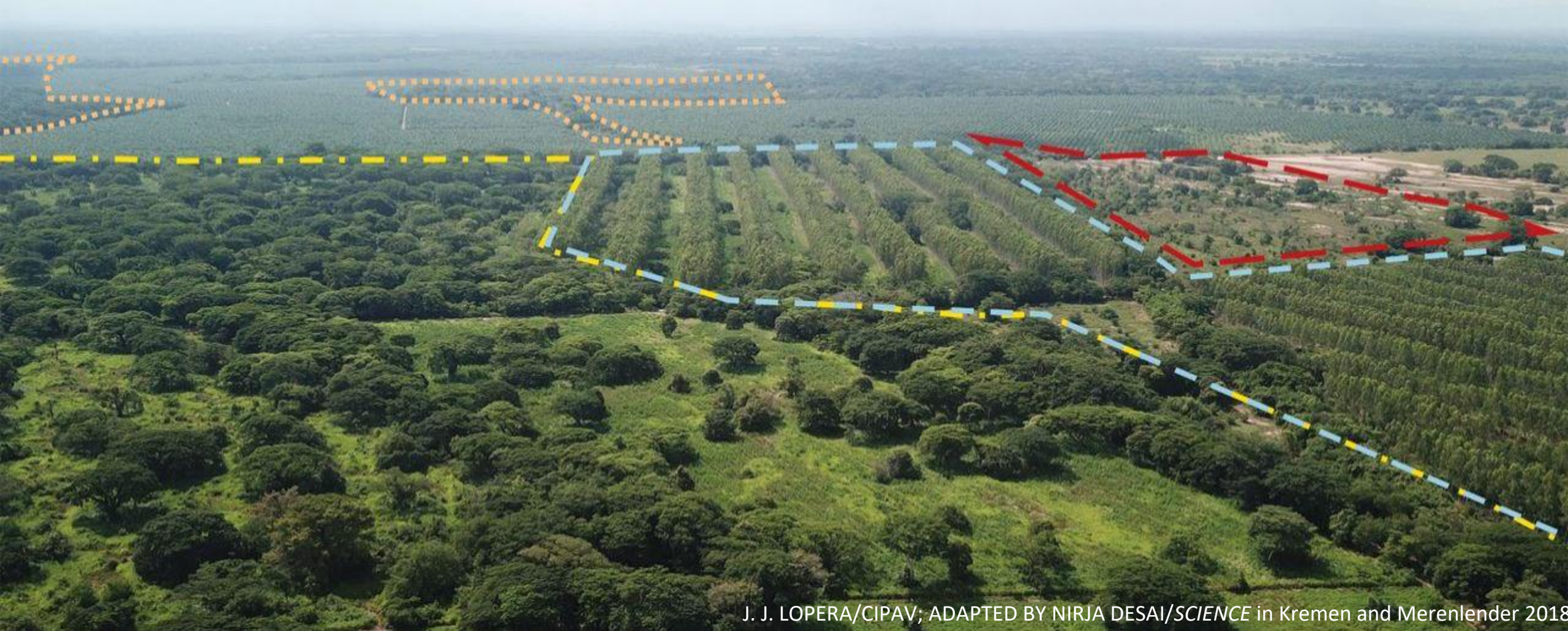
Alley cropping



© J.B. Friday

Multi-story cropping / Forest Farming

Food, herbal, botanical, or decorative crops under a forest canopy that is managed to provide ideal shade levels as well as other products



J. J. LOPERA/CIPAV; ADAPTED BY NIRJA DESAI/SCIENCE in Kremen and Merenlender 2018

Silvopasture

The combination of trees with livestock and their forages on one piece of land



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Alley Cropping

Trees or shrubs planted in rows with crops cultivated in the alleys between the rows of woody plants



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Windbreak

Row of trees used to shelter crops, animals, buildings, and soil from wind



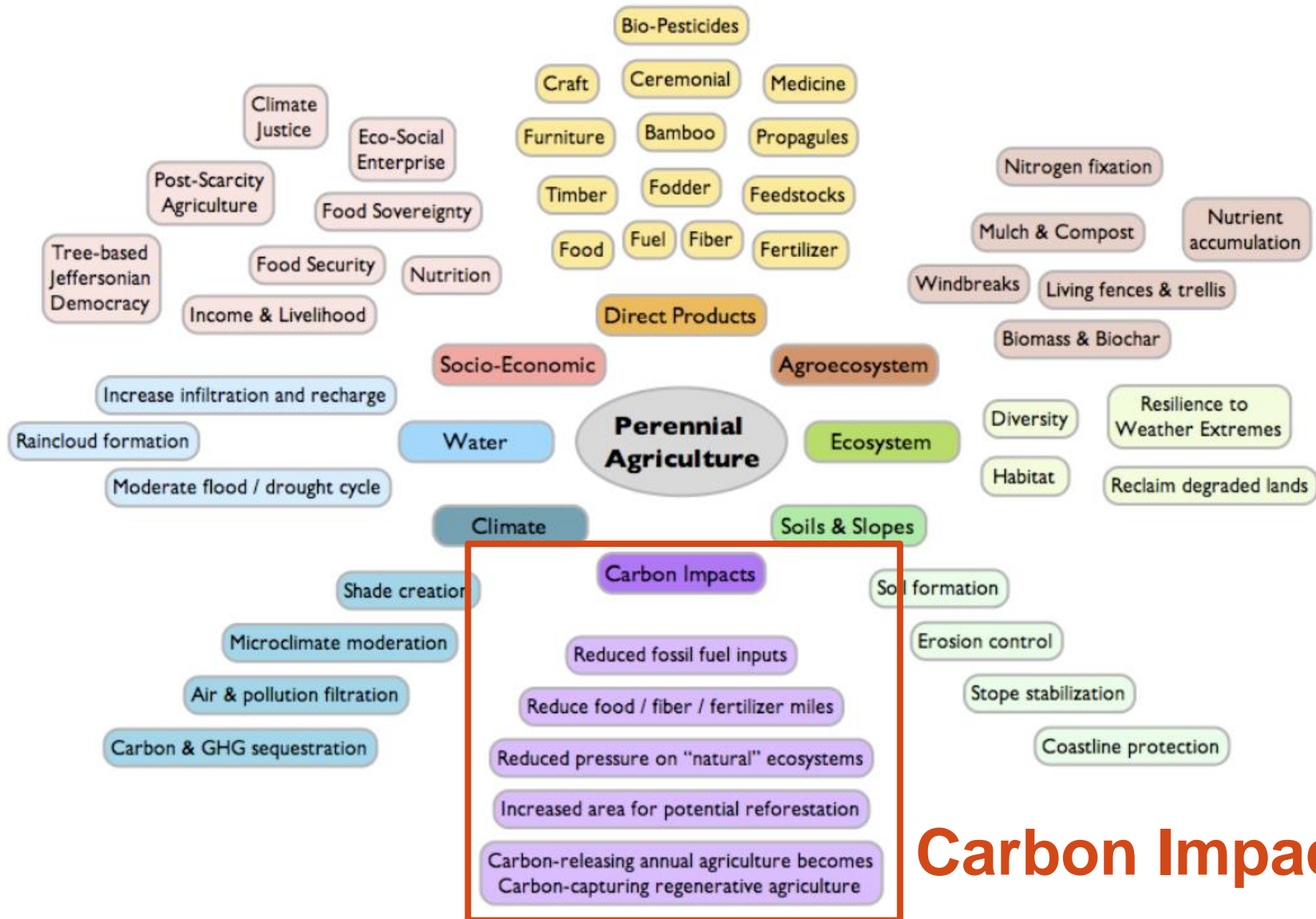
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Riparian Buffer

Areas along rivers and streams made up of trees, shrubs, and grasses

Multiple Functions of Perennial Agriculture

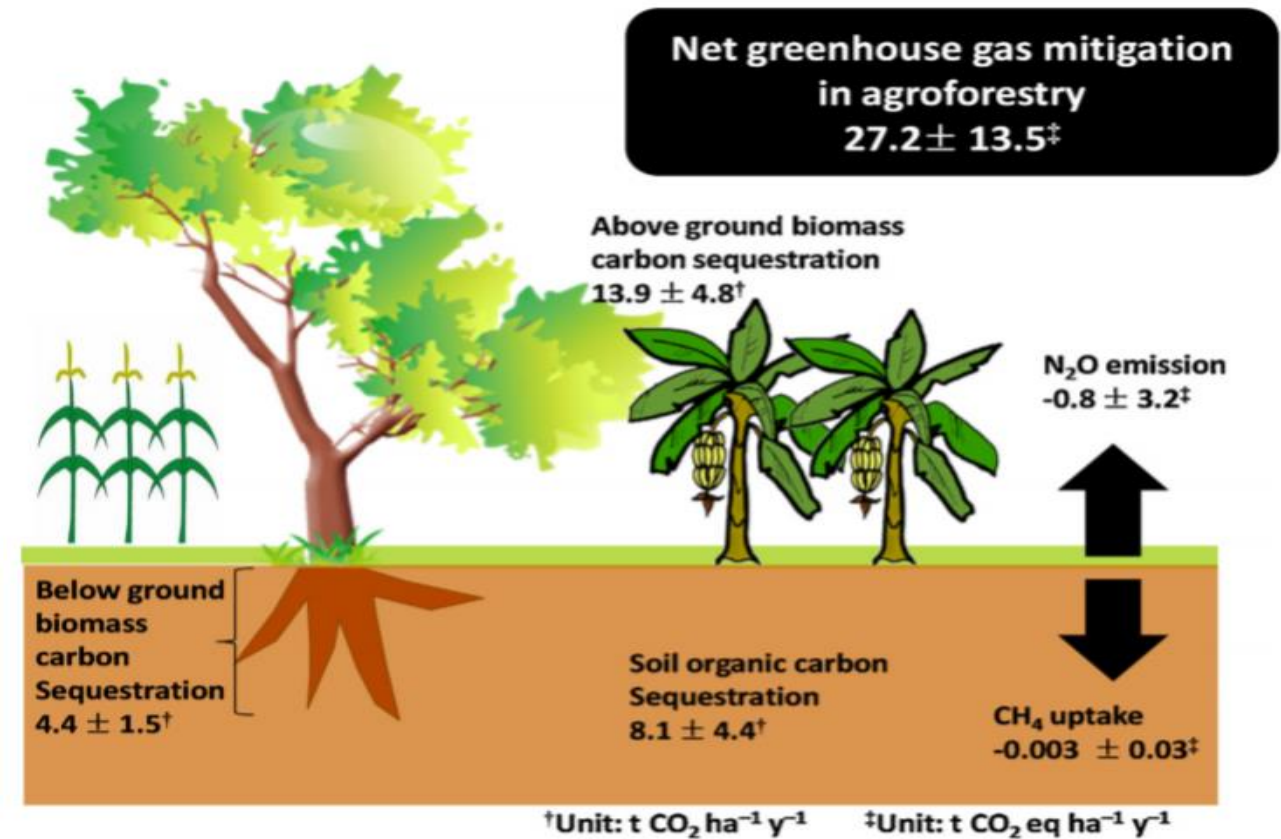
Version 1.5, Developed by Eric Toensmeier, mind-mapped by Ethan Roland



Carbon Impacts

1.2 GHG Sequestration in Agroforestry Systems

- Integrated systems have higher sequestration rates than linear systems
- Amount of GHG sequestered is site specific - varies based on many factors
- No data for agroforestry systems in Hawai'i



1.3 Agroforestry in Hawai'i

- Traditional Native Hawaiian land use
- Few integrated systems exist in Hawai'i today
- Several state and federal policies affect agroforestry adoption
 - Federal: *Environmental Quality Incentives Program (EQUIP), Food safety (GAP), etc.*
 - State: *Forest Stewardship Program, Agricultural Loan Program, Tax Credits*



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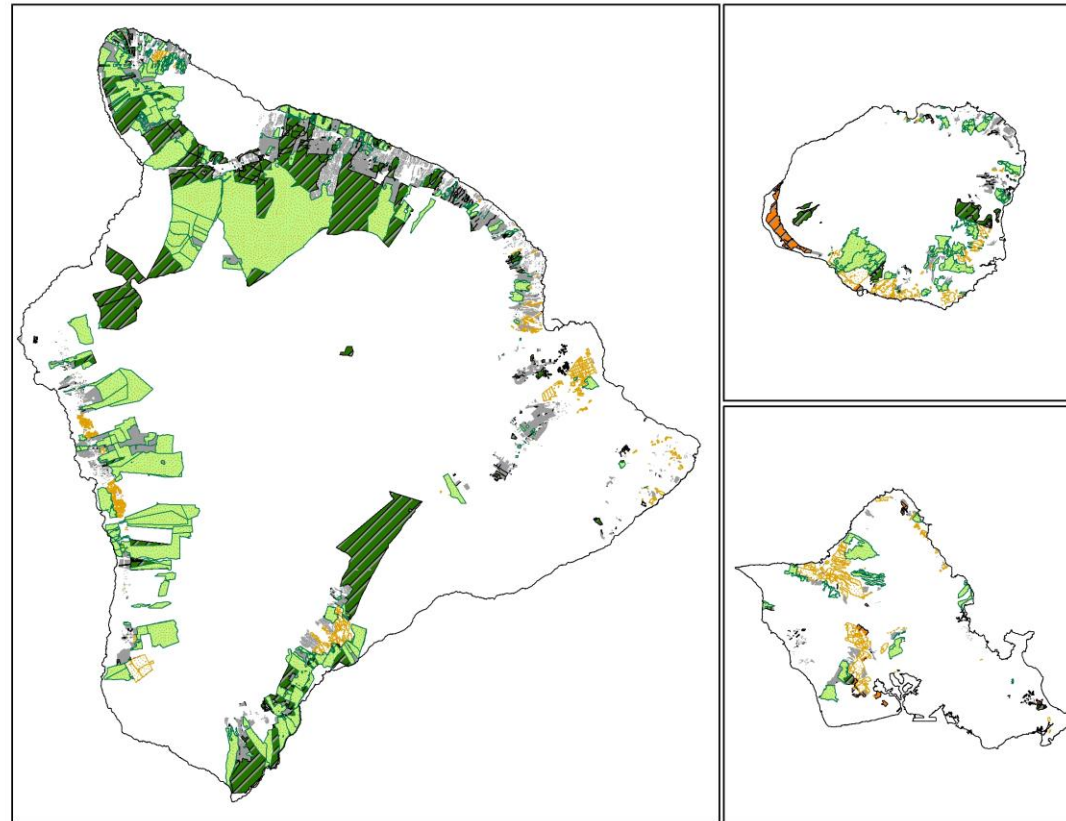
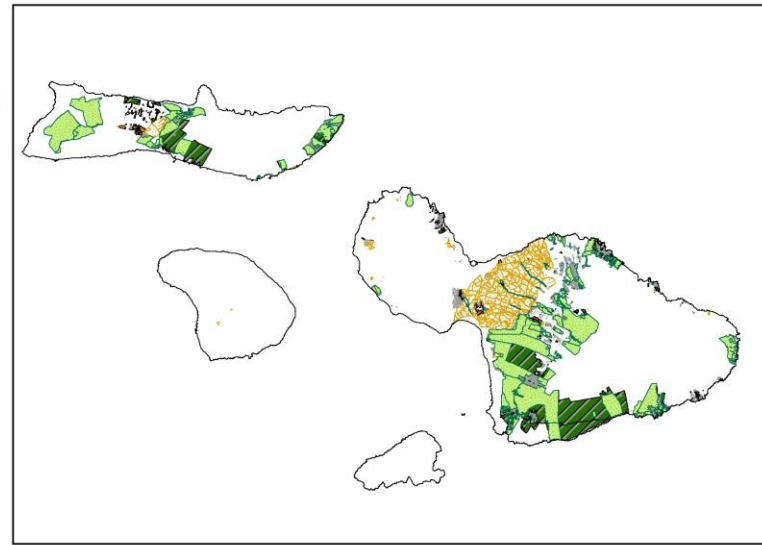
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Government and Private Agricultural Land



Kilometers
0 5 10 20

- Private Pasture Land
- Government Pasture Land
- Private Crop Land
- Government Crop Land
- Total Agriculture Land



*Data Source: 2015 Hawai'i State
Department of Agriculture – State Ag Land
Use Baseline*

1.4 Symptoms of the Issue

- Annual crops grown in monoculture systems
- Environmental issues resulting from conventional agriculture
- Lack of adoption of agroforestry



1.5 Framing and Modeling the Issue

Market Failures and Limitations

- Positive Production Externality
- Intertemporal Problem
- Risk/Uncertainty

2. Policy Goals

2.1 Goals and Impact Categories

| Goal | Impact Categories |
|--------------------------|---|
| 1) GHG Sequestration | 1.1 Increased GHG sequestration |
| 2) Efficiency | 2.1 Benefits of policy implementation to producer |
| | 2.2 Cost of policy implementation to State |
| 3) Social Equity | 3.1 Fairness to small produces |
| 4) Local Food Production | 4.1 Amount of agricultural land in production |
| 5) Political Feasibility | 5.1 Acceptability of the policy - to producers, policy makers, and voters |
| | 5.2 Capacity to implement the policy |

3.Methods

3.1 Policy Alternatives

| Instrument Type | Policy Alternative |
|-----------------------------|--|
| 1) Status Quo | Continue with existing policies as written |
| 2) Loan | Amend Agricultural Loan Program Create an Agroforestry Loan Program modeled after the Aquaculture Loan Program |
| 3) Incentive | Amend the Forest Stewardship Program to define agroforestry and reduce regulatory burden on agroforestry producers |
| 4) Land tenure | Amend state agricultural land management rules to prioritize long term leases for agroforestry |
| 5) Government Supply | Create a temporary directive for the Agriculture Development Corporation to develop agroforestry business plans |

3.2 Prediction, Valuation, & Assessment

- Qualitative
 - Literature Review
 - Interviews
- Based on past performance of existing programs
- Assumptions



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4. Assessment

Low (1)

Medium (2)

High (3)

Goal 1: GHG Sequestration

| Impact Category | Policy Alternatives | | | | |
|------------------|---------------------|---------------------------|----------------------------|-----------------|--|
| | Status Quo | Agroforestry Loan Program | Forest Stewardship Program | Long-term Lease | Agroforestry Business Plan Development |
| GHGs Sequestered | Low | Medium | Medium | Medium | Medium |

Goal 2: Efficiency

| Impact Category | Policy Alternative | | | | |
|---|--------------------|---------------------------|----------------------------|--------------------|--|
| | Status Quo | Agroforestry Loan Program | Forest Stewardship Program | Long-term Lease | Agroforestry Business Plan Development |
| Benefit of policy to producer | Low | Medium | High | Low | Medium |
| Cost of policy implementation to government | High (low cost) | High (low cost) | High (low cost) | High (low cost) | High (low cost) |

Goal 3: Social Equity

| Impact Category | Policy Alternatives | | | | |
|-----------------------------|---------------------|---------------------------|----------------------------|-----------------|--|
| | Status Quo | Agroforestry Loan Program | Forest Stewardship Program | Long-term Lease | Agroforestry Business Plan Development |
| Fairness to small producers | Low | High | Medium | High | Medium |

Goal 4: Local Food Production

| Impact Category | Policy Alternatives | | | | |
|--|---------------------|---------------------------|----------------------------|-----------------|--|
| | Status Quo | Agroforestry Loan Program | Forest Stewardship Program | Long-term Lease | Agroforestry Business Plan Development |
| Amount of land converted from fallow to agroforestry | Low | Medium | Medium | Low | High |

Goal 5: Political Feasibility

| Impact Category | Policy Alternatives | | | | |
|-----------------------------|---------------------|---------------------------|----------------------------|-----------------|--|
| | Status Quo | Agroforestry Loan Program | Forest Stewardship Program | Long-term Lease | Agroforestry Business Plan Development |
| Acceptability of the Policy | High | Medium | High | Medium | Low |
| Capacity to Implement | High | Medium | Medium | Medium | Low |

Scoring Outcomes

| Impact Category | Status Quo | Agroforestry Loan Program | Forest Stewardship Program | Long-term Lease | Agroforestry Business Plan Development |
|--|------------|---------------------------|----------------------------|-----------------|--|
| GHGs Sequestered | 1 | 2 | 2 | 2 | 2 |
| Benefit of policy to producer | 1 | 2 | 3 | 1 | 2 |
| Cost of policy implementation to government | 3 | 3 | 3 | 3 | 3 |
| Fairness to small producers | 1 | 3 | 2 | 3 | 2 |
| Amount of land converted from fallow to agroforestry | 1 | 2 | 2 | 1 | 3 |
| Acceptability of the Policy | 3 | 2 | 3 | 2 | 1 |
| Capacity to Implement | 3 | 2 | 2 | 2 | 1 |
| Total Score | 13 | 16 | 17 | 14 | 14 |

Assessment Summary

- Highest scores in all categories:
 - Amending the Agricultural Loan Program
 - Amending the Forest Stewardship Program (FSP)
- Loan program has lower acceptability – requires earmarking funds for agroforestry
- Forest Stewardship Program is more efficient - benefit to producer is higher than loan program; cost to government is the same for both alternatives



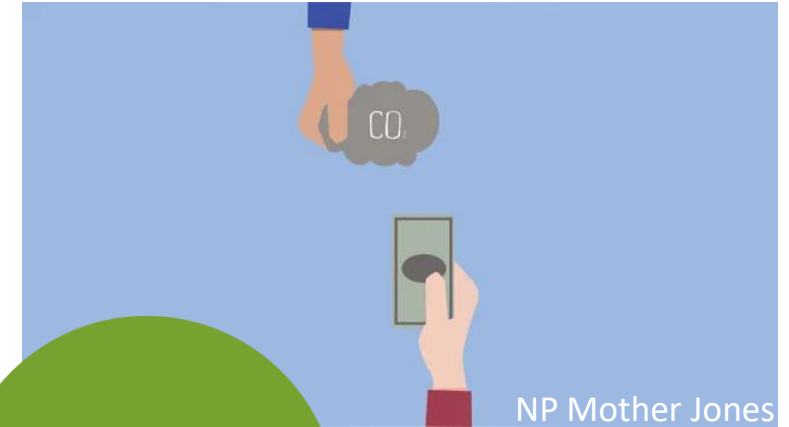
5. Recommendations

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- Amend the Forest Stewardship Program
 - Define agroforestry in statute
 - Reduce minimum acreage from 5 acres to 1 acre for agroforestry systems
 - Replace the requirement for a management plan with a business plan for agroforestry systems of less than 5 acres

5.1 Potential Funding Scenarios

1. Carbon Tax: *taxation of carbon emissions*
2. Tourist Environmental Fee: *incorporate the costs of GHG emission and damages as 'offset' fee*
3. Carbon Offsets for Flights: *compensate emissions*
4. Carbon Offsets for Shipping: *compensate emissions*
5. Barrel Tax Expansion: *expand tax to cover jet fuel, increase price*



InsideEvs

6. Next Steps

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1. Work with stakeholders to define of agroforestry for the Forest Stewardship Program
2. In addition to this we recommended that the Taskforce consider:

- Research
- Outreach
- Education



Questions?

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